THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

VOL. XVI. No. 390—19th YEAR.] LONDON, OCTOBER 1, 1867. [Subscription per Ann. { 15s. in Advance / 18s. Credit.] DOUBLE No. Price 1s.

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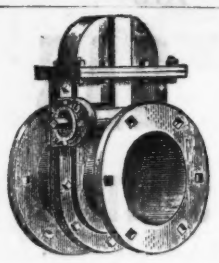

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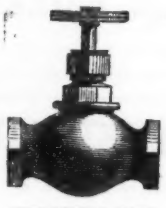

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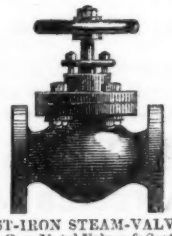

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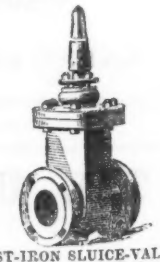

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NOTICES.

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TO CORRESPONDENTS.

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THE JOURNAL OF GAS LIGHTING,
WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, OCTOBER 1, 1867.

Notes upon Passing Events.

THE labour question, as affected by modern facility of intercourse, by the universal distribution of news, and by the increased political power of the working classes in almost every European country, must continue to be one of the most interesting questions of real life in England. Cheap railway conveyance and the funds of associations enable journeymen of England to meet the journeymen of France and Germany in Switzerland, and to fraternize, as far as words go, with each other and against the tyrant capital. But if we dive beneath the surface of these public demonstrations and of speeches made to be reported, we find that there is very little real sympathy between English and French workmen except in hostility to masters and capital. The Frenchmen, over the *chope* of beer, despise the English for their want of large ideas; and the English, over the luxury of cheap and bad brandy and water, sneer at the French for their want of practical plans and the badness of their workmanship. The latter sounds rather odd when we have been hearing so much of the superiority of foreign over British manufactures, but that is a superiority on which great noblemen, great engineers, and great manufacturers may make, and with good reason, telling speeches, but the workmen will not believe it. Go and ask a carpenter in one of Cubitt's shops, or any other first-rate builder, what he thinks of French or German carpenters, and he will tell you that he never saw the work of one that would pass muster in any great town in England—that their tools are so inferior, their planes so toylike, their saws so primitive, that they cannot make good work even if there were any demand for it, which there is not. Go, again, to Penn's or Maudslay's, and take the opinion of one of the most devoted followers of Mr. Potter and trades-union law. He will be positive, and so will all his fellow-workmen, that foreign builders of machinery only succeed as long as they slavishly imitate British work. This may be insular prejudice, but it is universal. Ask why we are successfully invaded in our stronghold of metal work and machinery, and the British unionist tells you that where labour is 60 or 80 per cent. of the cost of a machine, the cheap labour, the unlimited assistance of women and boys, whose labour is protected by English Acts of Parliament, is the cause, and if he has any confidence in you will probably suggest the propriety of a protective duty. He will not suggest the important fact that the inevitable trades unions of all countries, except England, are so watched and trammelled by police law that they can only strike and starve. They cannot meet to organize those financial and terroristic arrangements which make trades unions so powerful in free England. Thus, as working men's public opinion is not prepared to accept the doleful prophecies of England's manufacturing downfall with which English newspapers have lately been filled, we must not expect our working men to alter their course of action, or to moderate their demands for more wages, less work, and the diminution of the number of workmen in every trade that makes good wages. They may learn something from such a departure of trade as has reduced the skilled ironworkers of the Thames from wages of a pound a day to 15s. a week starvation, but, at any rate, they have not yet learned this from adversity, or from the lessons and essays of the newspapers that do not take their tone from the *Beehive*. For our own part, we consider that free trade would have done nothing for us if it had not given us the benefit of cheap continental labour. If the pure democracy of France, where Messrs. Odgers and Cremer tell us that the suffrage is not only universal but all powerful, can make war, but cannot protect women and children, or stop work on one day of the week, so much for the worse for democracy. When our ironworkers wives would condescend to taste butter with nothing less than a gold piece, it was certain that there was no hope for us but in foreign competition. But there are some articles of necessity that cannot be imported. We may send for French or Prussian locomotives, or we may import machine-made windows and doors, but we cannot import houses or bricks. The amiable brickmakers—who enforce the laws of little work and high wages by punishments varying from maiming and singeing up to actual murder—have been deprived of the use of their children by a recent Act of Parliament. The infants under eight years of age, who have been worth a great deal of beer to their thirsty if not affectionate parents, are no longer to be allowed to work at all; and the children under sixteen have had their value reduced at least half by being obliged to go to school, and not work more than six hours a day. We shall see if new taxes on masters will be attempted to recoup the parents for the loss of the services of their natural serfs. What is so easy a way of earning money as by setting children to work? But there is another view of the houses of the future. Bricks have fallen tremendously in price, but they may fall still lower. Attention is being called to the economy of building in concrete wherever the materials are to be found, in plenty of gravel and cement. In concrete walls, with suitable machi-

nery, unskilled labour can be employed. Already a patent system of machinery for concrete building "*Talls*" has excited a good deal of attention, because people feel what a comfort it would be to get rid of the brickmaker and the bricklayer, to use as much iron as possible instead of wood, and to use machine-made wood fittings where essential. If some day a great builder should succeed in erecting a great block of buildings without the assistance of any of the trades-union trades, we might expect a change in the tone of the gentlemen journeymen, whose great object appears to be to drawl gently through work, while carefully preventing any labourer from becoming a journeyman, or any journeyman from becoming a master. There is, however, one gleam of comfort in the very unsettled condition of employers and employed. Our people, however discontented, rely on themselves to mend the conditions of their existence. They do not expect to be made happy and prosperous by a single Act of Parliament, much less by a despotic decree. In France there is more discontent than in this country, and for at least two reasons—first, while the general tendency has been in this country to reduce the price of articles of consumption in food and clothing, and to reduce taxation, the general tendency in France has been to increase taxation, and raise the price of food by exportation. Wages have risen greatly in France, but so they have in England. We can look back to times when bread, meat, salt, sugar, tea, and all colonial produce was much dearer than it is now. The French, on the contrary, were accustomed to the cheapness of production with limited exportation. They look back to the good old times of thirty years ago, while we dwell on the comforts and luxuries that free trade and abolished taxes have given us. Then, again, the French of nearly all classes are in the habit of looking on the Government as a sort of special providence that can, by the stroke of a pen, make any trade flourish or fade—a theory that is all very well when things go well, but very inconvenient when a bad harvest, a financial crisis, or an American rebellion upsets the current order of trade. Our flying travellers are much deceived by the brilliant bustle of Paris—the most magnificent City of Pleasure in the world—fed by the lavish expenditure of the idle wealth of all nations, and governed by two most sagacious men. If every carrot brought into Paris is taxed, and if the poorer inhabitants are glad to eat the flesh of the horse and the ass because beef and mutton are too dear, they have the pleasure of seeing their money spent for their amusement, and they know that millions of money are brought to be laid out in Paris in consequence of the sacrifices made by the people to elegance and luxury. But you must go to the provincial towns of France, similar in position to Derby, or Macclesfield, or Halifax, to learn the deadly stagnation that weighs upon everything like intellectual progress. Paris is full of free libraries, galleries of art, and schools of art and science, open to the willing workman on the cheapest terms, where not absolutely gratuitous. Paris, too, possesses a society of artistic workman—mechanics who pay as much attention to the art part of their work as any British candidate for the honours of the Royal Academy—a society composed of art-workmen of all the European countries except English—of Italians, Germans, Swiss, Poles, as well as Frenchmen. These men carry a degree of enthusiasm into the work unknown in England, where honest, faithful work is common, but art feeling, out of the highly educated classes, almost unknown. But when you leave Paris, and investigate the social condition of towns of from thirty to fifty thousand inhabitants, you find a degree of mental stagnation almost incredible to the inhabitants of an English county town. It is not only that nearly all clever men gravitate to Paris, and all the important municipal officers are Government officials, but the restraints imposed on associations and on the right of meeting render those numerous societies which are the life of English towns almost impossible. Mental activity is kept alive in our provincial towns not a little by the myriads of cheap newspapers and periodicals of an instructive and amusing kind. All France cannot show anything like the weekly editions of the Manchester, Leeds, Liverpool, and Birmingham newspapers. French travellers of intelligence are amazed when they see the bales of newspapers, magazines, and serials of every kind, unloaded every Saturday even in our villages. While the means of education are more universal in France than in England, the supply of matter for reading and for pursuing education when school teaching is ended is infinitely more plentifully and cheaply diffused with us. It is in middle-class education—the education of the class that employers of capital spring from—that this country is most deficient. The most intelligent, enterprising, and successful manufacturers of the modern school in France have received their education at the Polytechnique School. Our manufacturers only by exception give their sons anything in the shape of a technical education. If they desire more than the routine of our universities, they must send to France, Germany, or Switzerland.

An article in the *Revue Contemporaine* on the manufactures and industry of the Zollverein affords some interesting information at a time when the future of Germany so largely fills the public mind. When, about thirty years ago, the Zollverein was formed, and entered on a manufacturing career, the views of the promoters of that great commercial league were confined to supplying the home demand. The export trade was dependent on arrangements with the Hanseatic ports. In Germany, as in France, the rural population largely exceeds in number any other. There are no cities equal to Manchester or Glasgow. Iserlohn, Solingen, and Remscheid, can no more compare with Birmingham and Sheffield than Aix-la-Chapelle can with Leeds, or Chemnitz with Bradford. Nevertheless, the progress of the manufactures of the Zollverein has been very rapid. The populations have doubled, tripled, and even quadrupled in forty years. Thus, Breslau has increased from 78,000 to 164,000; Elberfeld and Barmen, from 43,000 to 122,000; Cologne, from 56,000 to 122,000; Nuremberg, from 27,000 to 70,000. In like manner the capital cities which share in the benefits of commercial prosperity. The population of Berlin has increased from 200,000 to nearly 700,000, and that of Dresden from 55,000 to 146,000 in the same period. It is in Westphalia, in the county of Berg, and in the environs of Aix-la-Chapelle, that metal manufactures have been most developed. Linen manufactures, although suffering from too long adherence to hand-work against machinery, has held its ground in Westphalia, Saxony, and Silesia, where likewise woollen manufactures have made, and continue to make, great progress, as well as in Brandenburg and the districts of Aix-la-Chapelle. The town of Chemnitz, in royal Saxony, has become the centre of an important manufacture of printed woollen fabrics, which is also carried on in Thuringia. Spinning and weaving cotton are largely carried on in Saxony, in the valley of the Wipper, at Elberfeld-Barmen, and on the banks of the Rhine at Cologne, Gladbach, and Rheydt. Silk manufactures flourish at Crefeld and at Viersen, as well as at Elberfeld-Barmen, where also the production of mixed fabrics of silk has attained considerable importance. Beet-root sugar, one of the most important of the modern manufactures of the Zollverein, is most vigorously carried on in Prussian Saxony and Silesia. Chemnitz is often called the Manchester of Saxony. Having at its doors the rich coal mines of Zucchau, it produces not only cotton fabrics, but linen, hemp, and woollens, spinning, weaving, and dyeing, and has also great factories for the manufacture of the necessary machinery. The provinces which participate the least in this manufacturing progress are those on the shores of the Baltic and the North Sea, the only important manufacture being that of tobacco at Bremen. The least industrious of this vast coast region is Mecklenburg, where feudal laws still prevail, administered by an aristocracy of the narrowest and most bigoted character. South of the river Maine there is only one essentially manufacturing district, of which Nuremberg and Furth are the centres. Bavaria proper is the least manufacturing country of meridional Germany. The manufactures of Nuremberg are of a very varied character, and occupy two-thirds of the population. Augsburg has seventy establishments, employing eight thousand workmen. The manufacturing force of the south is, however, very inferior to that of the north. The production of articles of luxury is much less developed in the Zollverein than in France or in wealthy England, a country less successful than Germany in the cultivation of the fine arts, but where, for the last ten years, great attention has been paid to the application of art to manufactures. The superiority of France depends on the superiority of French taste, which is shown in design, colour, and form of everything produced for the wealthy and fashionable. Germany has nothing to rival the splendours of the best produce of Lyons or the magnificence of French shawls and carpets. France is also unrivalled in gloves, fine hats, Sèvres porcelain, bonnets, glass work, jewellery, and art bronzes. The only competition possible is in cheap imitations. The practice of art applied to manufacture is more actively centralized in Paris than in any

city of the world, and Paris, the greatest school of design and modelling in the world, rules all France in matters of taste, and sets the fashions of the whole world. There is no such centralization of the artistic and industrial movement of Germany. The exportation from France to the Zollverein in 1865, when the treaty first came into force, amounts to 133,500,000 francs, and the importation from the Zollverein to only 18,500,000. This last figure is, however, double the amount of the preceding year. The Zollverein possesses in Saxony, in Erzebirge, Silesia, in the Hartz district—which is in the middle of Hanover—in Nassau, the two Hesses, in Thuringia, in part of Bavaria, and several other districts of Bavaria, Wurtemburg, and Baden, rich mines of coal, iron, zinc, tin, lead, and silver. Rock salt and salt springs also abound. The only countries with no mineral wealth are the duchies of Nassau, Oldenburg, and Luxemburg. For more than century a celebrated mining academy has existed in the environs of Freiberg, in Erzgebirge. The extraction of silver in that district and the Hartz had much more importance in the middle ages than in the present day. The other metallic industries in great part date from the creation of the Zollverein, and the progress has been amazing.

The Prussian Minister of Commerce made for the Paris Exhibition a very curious collection of specimens of the produce of all the mines of the monarchy. It is accompanied by a scientific and explanatory catalogue prepared under the auspices of the chief of the department. Fifteen years ago the Zollverein only produced 150,000 tons of pig iron, while France produced 400,000 to 500,000; Belgium, 200,000; Austria, 100,000; and Great Britain alone, 1,500,000, or more than all the rest of Europe put together. At present Westphalia produces more steel than England. The general production of smelted iron has been enormously increased. Germany still imports 1,500,000 tons of coal from England, chiefly for consumption in the ports and for steam navigation; but, on the other hand, the Zollverein has raised its exportation of coal from 273,000 to 2,500,000 tons. A few years ago inferior in production to France and Belgium, the Zollverein now exports coal to an amount double that of those two countries, and nearly one-fourth of the exportation of Great Britain.

GAS LEGISLATION OF 1867.

Forty-one new Acts for regulating the supply of gas were passed through Parliament and received the Royal Assent during the last session. Fourteen have for their object the granting of additional powers to companies previously incorporated; sixteen confer parliamentary authority on joint-stock companies which had been carrying on their operations without statutory powers; six grant additional powers to local authorities for the purchase or extension of gas-works; four of the Acts are for the incorporation of new companies; and one merely confirms an agreement between the Derby Gas Company and the Midland Railway Company. Two Bills, having for their object the incorporation of competing companies—viz., the Chester Paraffin Light Company and the Gillingham, Brompton, &c., Company—were not proceeded with; and the Bills promoted by metropolis gas companies and the Metropolis Gas Act Amendment Bill shared the same fate. The first class of fourteen Acts comprises the following:—

The *Barnsley Gas Act* empowers the company to extend their limits, to purchase additional land, and to double their present capital of £40,000; the dividends on the new shares being restricted to 7 per cent., and, if issued with preference, to 6 per cent. It is provided also that the dividends on one-third of the preference shares to be created may be deferred until the full amount of the prescribed dividend on the existing shares be paid. The maximum price of 14-candle gas is to be 4s. per 1000 feet within the town of Barnsley, and 6s. beyond, for the first ten years after the passing of the Act, and afterwards 5s. No notice need be given before testing the illuminating power of the gas, its purity not being specified. Provisions are introduced giving the canal company power to alter the positions of the mains, and for protecting canals and navigable rivers. In the Bill as introduced into Parliament, the maximum price named was 6s. per 1000 feet, the rate of dividend on the new capital was 8 per cent., and a notice of six hours was required before testing the gas.

The *Cambridge Gas Act* alters the title of the company to the "Cambridge University and Town Gaslight Company," and extends their limits to one mile beyond the boundaries of the fourteen parishes of the town. It was feebly opposed by the corporation, but underwent no material modification. The present capital of £38,400 may be increased by the issue of shares to the amount of £50,000, with a prescribed dividend of 7 per cent. The illuminating power of the gas is to be 14 candles, and its maximum price 4s. per 1000 feet. It is to be free from ammonia and sulphuretted hydrogen, and not to contain more than 20 grains of sulphur in any form in 100 cubic feet, as tested by Dr. Letheby's apparatus; no notice being required before testing. The company are empowered to purchase 3 acres of additional land. There are several special provisions in the Act adapted to the university, among which it is provided that "spiritual persons" may participate in the management of the undertaking; and there are saving clauses for protecting the rights of the university and of the local authorities. No works for the manufacture or storeage of gas are to be erected within 300 yards of the Botanic Garden, nor of any of the buildings or lands occupied by the authorities of the university, without their consent. In the original Bill the prescribed rate of dividend on the new capital was 8 per cent., and there were provisions for raising the price of gas in correspondence with a rise in the price of coal, but no standard of purity was named.

The *Dundee Gas Company's Act* authorizes the company to raise £50,000 additional capital, with prescribed dividends of 7 per cent. on ordinary shares and of 6 per cent. on preference shares. The standard of illuminating power is to be 18 candles, and the price is to be the average of the prices charged in Edinburgh, Glasgow, Paisley, Perth, Arbroath, Montrose, and Aberdeen. No test of purity is mentioned. In the original Bill the standard of illuminating power named was only 14 candles, and there was no reference to price.

The *Dundee New Gas Company's Act* empowers the company to increase their present capital of £40,000 by the addition of £15,000, with limitation of dividends to 7 per cent. on ordinary, and to 6 per cent. on shares issued with preference. The provisions respecting the illuminating power and price are the same as in the Act of the old company. A Bill was introduced for the amalgamation of the two Dundee gas companies, but it was not proceeded with.

The *Great Grimsby Gas Act* authorizes the company to increase their present capital of £16,500 by the addition of £60,000, the dividends on which are limited by a sliding scale according to the price of gas, as follows:—When the price exceeds 3s. 6d. per 1000 feet the prescribed dividend is 7 per cent., and an additional 1 per cent. of the profits may be divided for every reduction in the price of 3d. per 1000 feet, so that when the price charged is 2s. 9d. per 1000 feet the holders of the new shares would be entitled to receive 10 per cent. The standard of illuminating power is 14 candles, and the maximum price 4s. 6d. per 1000 feet. The limits of the company's district are extended, and they are authorized to purchase 4 additional acres of land. In the original Bill the prescribed rate of dividend was 8 per cent., without a sliding scale, the maximum price in the outlying districts 5s., and the quantity of land the company proposed to purchase was 10 acres.

The *Hartlepool Gas and Water Act* empowers the company to double their present capital of £100,000, the prescribed rate of dividend on the new capital being 7 per cent. on ordinary shares and 6 per cent. on preference shares. The illuminating power of the gas is to be 14 candles, and it is to be free from sulphuretted hydrogen. No notice need be given before testing. The price within the present limits of supply is not to exceed 5s. per 1000 feet, and 6s. 8d. beyond those limits. The gas to the public lamps is to be supplied at the lowest price charged to any private consumer. It is provided, in the clause relating to the supply of gas by meters, that "it "shall be open to the company to show that more gas passes "through a meter than is thereby registered." In the Bill as introduced the maximum price to be charged generally for 12-candle gas was 6s. 8d., and the prescribed dividend on the new capital 7 per cent. A notice of six hours was also required before testing the gas.

The *Kidderminster Gas Act* repeals the former Act of the company, and empowers them to raise £18,000 additional capital, whereof £3600 consists of profits applicable to dividend expended on the works, which portion is to be issued as preference stock. The prescribed dividend on the ordinary shares of the new capital is 7 per cent., and on the preference stock 6 per cent. The maximum price of 14-candle gas is to

be 4s. 6d. per 1000 feet. No standard of purity is named, and a notice of 24 hours is to be given before testing the illuminating power. The company are required at their own expense to raise, sink, or alter mains at the request of the corporation. In the original Bill the prescribed rate of dividend on new capital was 7½ per cent., and the standard of illuminating power 12 candles.

The *Newcastle-upon-Tyne and Gateshead Gas Act* empowers the company to add £100,000 to their present share capital of £200,000, the dividends on the new capital being limited to 7 per cent. on ordinary shares, and 6 per cent. if issued with preference. It is provided that the holders of preference shares shall not be entitled to vote, unless specially privileged at the time of the creation and issue of such shares. Power is also given to the company to raise additional capital for the purchase of the undertaking of the Walker and Wallsend Union Gas Company, as authorized by their Act of last session. There are clauses limiting the district of the company, so as not to interfere with the South Shields Company. The company are also authorized to purchase 25 acres of additional land, and to erect works at Gateshead. This Act repeals so much of the company's Act of 1864 as provided that the gas shall not contain more than 15 grains of sulphur in 100 cubic feet, and the quantity of 17 grains is substituted; it being provided that in testing the gas 10 cubic feet shall be consumed. The gas may be tested without notice. The present standard of illuminating power and the price remain unaltered. In the Bill, before it was amended, the prescribed dividend on new capital was 8 per cent., the quantity of additional land named was 50 acres, and there was no reference to the purity of the gas.

The *Rochester, Chatham, and Strood Gas Act* repeals the former Act, and authorizes the company to raise £14,000 additional share capital, on which the prescribed dividend is 7 per cent. for ordinary shares and 6 per cent. for preferential shares. The original capital of the company was £14,000, and they have expended on the works, out of profits, £84,000, which they sought to capitalize on the same terms as the original capital, but not more than £28,000 of that amount was capitalized by the Act, which is entitled to rank with the original capital in regard to dividend. The entire capital of the company is, therefore, £56,000. The maximum price of 14-candle gas is fixed at 4s. per 1000 feet, and it is to be tested for sulphuretted hydrogen, without any notice being required. Twenty-four hours notice was named in the Bill. The quantity of land to be held by the company is not to exceed 15 acres. The public lamps are to be supplied with gas at the lowest price charged to any private consumer. In prescribing the limits of the company's district, it is provided that the powers conferred by the Act shall only be exercised within the precincts of Rochester Cathedral with the consent of the dean and chapter. In the Bill, before it was amended, the proposed limitation of dividends on the new capital was 8 and 7 per cent.

The *Scarborough Gas Act* empowers the company to raise £40,000 additional capital, with limitation of dividends to 7 and 6 per cent. on ordinary and preference shares respectively, the new shares to be sold by auction. The illuminating power of the gas is to be 15 candles, and the maximum price 5s. per 1000 feet to private consumers, and 3s. 6d. to the local authorities for gas supplied to the public lamps, burning at the rate of 4½ cubic feet per hour. At the option of the Local Board the gas may be supplied to the public lamps by meters, to be fixed at the cost of the Board, and the company, if required, are to provide lamps and posts, and clean, light, extinguish, and repair for 17s. per lamp per annum. No standard of purity is named in the Act. The prescribed dividend on new ordinary shares named in the Bill was 7½ per cent., and there was no notice of the illuminating power and price of the gas, nor any reference to public lighting.

The *South Shields Gas Act* authorizes the company to raise £40,000 additional capital, the dividends on which are limited to 7 and to 6 per cent. on ordinary and on preference shares, the holders of the latter not being entitled to vote without consent given at the time of issuing such shares. The quantity of land to be held by the company is limited to 10 acres. The limits of the district of the company in the town of Jarrow are specified, as arranged with the Newcastle Company. The maximum prices of the gas supplied within the borough are to be 4s. per 1000 feet and 5s. beyond, with discounts varying from 5 to 30 per cent., according to the quantities consumed. The illuminating power of the gas is to be equal to 14 uncased sperm candles, and it is not to contain more than 5½ grains of sulphur in 25 cubic feet, Dr. Letheby's sulphur test being named as the testing apparatus to be employed. The public lamps are to be supplied with 5 cubic feet of gas per hour, and to be lighted, cleaned, extinguished, and repaired, at a charge of 1s. per week, the number of hours they are to burn not being specified. In the Bill as introduced into Parliament there was no reference to the quality or price of the gas, and 8 per cent. was the prescribed dividend on the new shares.

The *Stalybridge Gas Act* empowers the company to raise, by the issue of new shares, £50,000, thus making the whole capital amount to £110,000. The prescribed dividends on the new capital are 7 and 6 per cent. on the ordinary and preference shares respectively; and if debenture stock be issued the dividend on such stock is limited to 5 per cent. The holders of preference shares are not to be entitled to vote without consent. The standard of illuminating power is 14 candles, but no price, nor is the purity of the gas named. No notice is required before testing. The quantity of land to be held is limited to 16 acres. In the original Bill 20 acres of land was the quantity named; the prescribed dividend on ordinary shares of the new capital was 8 per cent., and the quality of the gas was not specified.

The *Stratford-upon-Avon Gas Act* is very brief. It authorizes the company to double their present share capital of £6750, with the usual limitation of dividends on ordinary and on preference shares. The illuminating power of the gas is raised to 14 candles.

The *Wells Gas Act* repeals the previous Act, and reincorporates the company with additional powers. The existing share capital of £4000 is to be increased by the creation of £2000 preference stock, being a portion of £3000 expended on the works out of profits, on which the dividend is limited to 5 per cent. The company are also authorized to raise £8000 by the issue of new shares, with the usual limitation of dividends, and to purchase 3 acres of additional land. The maximum price of 14-candle gas is to be 5s. per 1000 feet within the city, and 6s. beyond it, and the public lamps are to be supplied at the lowest rate charged to any private consumer. The gas may be tested without notice. This Act passed without any amendment of the Bill as introduced into Parliament.

All the Bills promoted by joint-stock companies to obtain parliamentary powers were passed. There are 16 of these Acts, as follow:—

The *Barking Gas Act* authorizes the company to increase the present share capital of £20,000 to £50,000, the dividends on the new capital being limited to 7 per cent. on ordinary shares, and to 6 per cent. if issued with preference. In the Bill 7½ per cent. was named for ordinary shares. The maximum price of 14-candle gas is to be 6s. per 1000 feet; 24 hours notice to be given before testing. There is no standard of purity.

The *Crickhowell Gas and Water Act* authorizes the company to purchase the existing gas-works from Mr. Christopher, according to agreement, for the sum of £2000. The share capital of the company is limited to £4000. The maximum price of 14-candle gas is to be 6s. per 1000 feet. There is no standard of purity. The gas may be tested without notice. The amount of capital named in the Bill was £8000, but no agreement for the purchase was scheduled; and the illuminating power proposed was 12 candles.

The *Dartford Gas Act* empowers the company, which was established in 1826 with a capital of only £4400, to raise £10,000 additional share capital, with prescribed dividends of 7 and 6 per cent. The maximum price of the gas is to be 5s. per 1000 feet, and its illuminating power 14 candles. No notice is required before testing. The quantity of land to be held by the company is not to exceed 5 acres. The additional capital applied for in the Bill was £12,000, and the prescribed dividends named were 10 per cent. on ordinary new shares, and 6 per cent. on preference. Six hours notice was also required before testing.

The *Enfield Gas Act* authorizes the company to double their existing share capital of £12,000, the dividend on the new shares being limited to 7 per cent. The maximum price of 14-candle gas is to be 5s. 6d. per 1000 feet; no notice being required before it is tested. There is no standard of purity, nor is the quantity of land to be held named.

The *Eton Gas Act* gives power to the company to raise their present share capital of £5250 to £10,000, with limitation

of dividends to 7 and 6 per cent. The new shares are to be sold by auction. The illuminating power is to be equal to 18 candles, and the maximum price 7s. per 1000 feet; it being provided that the charge for gas supplied to the public lamps shall not exceed £4 per lamp during the hours in each year in which they are now lighted. The gas is to be tested for sulphuretted hydrogen and for illuminating power without notice. In the Bill six hours notice was required before testing, and the prescribed dividend on ordinary new shares was 7½ per cent.

The *Hampton Court Gas Act* authorizes the company to raise £39,000 in addition to their present share capital of £36,000, the dividends on the new shares being limited to 7 and 6 per cent. on ordinary and preference shares respectively. The new shares may be sold by auction. The limits of the company's district are extended to the parishes of Hanworth and Feltham, and in prescribing the maximum prices of gas it is provided that during the term of the first ten years the price in those parishes shall be 7s. per 1000 feet, and afterwards not more than 6d. per 1000 feet above the price charged in Hampton, which would then be 5s.; but for the first five years after the passing of the Act the maximum price in Hampton is to be 5s. 6d. The standard of illuminating power is 14 candles, and the gas is to be tested for sulphuretted hydrogen; no notice being required before testing. The quantity of land to be held by the company is not to exceed 7 acres. Special provision is made to prevent the gas-mains from coming near the mains for the supply of water. Provision is also made for burning gas by meter in the street-lamps, at the option of the local authority, and at their expense. In the Bill the standard of illuminating power was 12 candles, and the maximum prices 6s. in Hampton, and 7s. in Hanworth and Feltham; there was no standard of purity, six hours notice was required before testing the gas for illuminating power, and the prescribed dividend on new ordinary shares was 7½ per cent.

The *Huyton and Roby Gas Act* gives power to the company to increase their share capital from £9000 to £20,000, the dividends on the new capital being limited to 7 and to 6 per cent. The illuminating power of the gas is to be equal to 14 candles, and its maximum price 7s. per 1000 feet during the first ten years after the passing of the Act, and 6s. afterwards. No notice need be given before testing the illuminating power, and the purity is not named. In the Bill the maximum price named for 12-candle gas was 10s. per 1000 feet, and a notice of 24 hours was required before testing.

The *Mitcham and Wimbledon Gas Act* authorizes the company to raise £80,000 share capital in addition to the £100,000 they were originally authorized to raise, but of which not more than £36,000 has been paid up. The usual limitation of dividend to 7 per cent. is applied only to the £80,000, without any restriction on the amount previously authorized to be raised, though not paid up. The maximum price for 14-candle gas is to be 5s. 6d. per 1000 feet. The company may hold 6 acres of land. No notice is required before testing the gas, nor was any required in the Bill; but the illuminating power proposed was 12 candles, and the quantity of land 10 acres.

The *Mold Gas and Water Act* contains several special provisions. In the first place, as the company are frequently subjected to considerable expense from the derangement of the ground by mining operations, a sliding scale of prices is provided according to the quantities consumed, from 1000 feet in three months to 50,000, the price for the lowest quantity being 6s. 8d. per 1000 feet, which diminishes in six successive stages to 4s. 9d. for the largest quantity consumed. The charge for gas, and for lighting and extinguishing the public lamps, is not to exceed 6s. 6d. per lamp per month. The illuminating power is to be equal to 14 candles, no degree of purity being specified, and not less than six hours notice to be given before testing. Another peculiarity of the Act is that the share capital may be raised from £6500 to £12,000 without any special limitation of dividend on the new shares. Power is given to divide the shares into half shares, one half of which may have preference, at the rate of 6 per cent., but the dividends on the preferred half shares are to be paid out of the profits of the year only. The quantity of land to be held not to exceed 10 acres. In the Bill as introduced into Parliament the maximum price named was 7s. 6d. per 1000 feet, without a sliding scale, and the illuminating power 12 candles.

The *Prescot Gas Act* sanctions the capitalization of £1000 expended out of profits on the works, with the original capital of £4000, on which united capital of £5000 the dividend is limited to 9 per cent. The company are empowered to raise £4000 additional share capital, with limited dividends of 7 and 6 per cent. The illuminating power is to be equal to 15 candles, and the maximum price 5s. 10d., the purity not being specified. The gas may be tested without notice. In the original Bill the company applied for power to purchase the Rainhill Gas-Works; the maximum price of gas was 5s. 6d. for 14-candle gas; the limitation of the dividend on the new shares was 8 per cent., and a notice of 24 hours was required before testing.

The *Richmond Gas Act* empowers the company to double their present capital of £30,000, and the dividends on the new shares are limited by a sliding scale according to the prices charged for gas, as follows:—When the price exceeds 4s. per 1000 feet the dividends are limited to 7 per cent.; when the price does not exceed 4s., 8 per cent.; when it does not exceed 3s. 9d., 9 per cent.; and when the price shall be at or under 3s. 6d., 10 per cent. The maximum prices from September 29, 1867, to September 29, 1868, are to be 4s. 6d. per 1000 feet in the parish of Richmond, and 5s. beyond; and after that period the prices are not to exceed 4s. 3d. in Richmond, and 4s. 9d. in other parts of the district. The illuminating power of the gas is to be equal to 14 candles, and it is not to contain more than 20 grains of sulphur in 100 cubic feet, as tested by Dr. Letheby's apparatus. A notice of three hours is to be given before testing. The original Bill contained no sliding scale of dividends; the standard of illuminating power was 12 candles; there was a fixed maximum price of 5s. per 1000 feet in Richmond, and 5s. 6d. beyond; and the purity test was limited to sulphuretted hydrogen.

The *Sutton, Southcoates, and Drypool Gas Act* empowers the company to extend their district so as to include the parishes of Garrison Side and Marfleet, near Hull, and to increase their capital from £24,000 to £100,000. The prescribed dividends on the existing shares, as well as on the new shares, are 7½ per cent. The borrowing power is limited to £5000 on the existing shares. The maximum price of 14-candle gas is to be 4s. per 1000 feet within the borough of Hull, and 4s. 6d. beyond. The "illuminating power and purity of the gas" may be tested without notice, but no standard of purity is prescribed. The gas supplied to the public lamps is to be charged not more than the lowest price to any private consumer, and the Local Board may, at their own expense, fix a test-meter on any lamp. The quantity of land to be held by the company is not to exceed 3 acres. In the original Bill the general maximum price was 5s. per 1000 feet, the illuminating power 12 candles, and a notice of six hours was to be given before testing.

The *Tynemouth Gas Act* authorizes the company to raise their present share capital of £34,570 to £70,000, the prescribed dividends on the new ordinary and preference shares being respectively 7 and 6 per cent. The quantity of land to be held by the company is limited to 15 acres. The maximum price of gas within the borough is to be 4s. per 1000 feet, and 4s. 6d. beyond, with discounts varying from 5 to 10 per cent. The illuminating power, tested by a defined burner, is to be equal to 14 candles, and the gas is not to contain more than 20 grains of sulphur in any form, as tested by Dr. Letheby's apparatus. The public lamps are to be supplied with gas, lighted, extinguished, and repaired, from sunset to sunrise, at a charge of 1s. a week during the first five years after the passing of the Act, and 1s. 1d. per week afterwards. No notice need be given before testing the gas. It is provided that the company may contract with the North-Eastern Railway Company for the use of a siding to their works. In the Bill before it was amended the maximum price named was 4s. per 1000 feet within the borough and 5s. beyond, without discounts; the standard of illuminating power was 12 candles, with a purity test for sulphuretted hydrogen only, and the land proposed to be held was 20 acres.

The *West Kent Gas Act* empowers the company to raise £100,000 share capital in addition to their original capital of £50,000, the dividend on the new shares being limited to 7 per cent. The maximum price is to be 5s. 6d. per 1000 feet, and the illuminating power is to be equal to 14 uncased sperm candles. The gas is not to contain more than 20 grains of sulphur, nor more than 5 grains of ammonia, in 100 cubic feet. Dr. Letheby's test is to be employed for ascertaining the quantity of sulphur, but it is provided that the lighting authority and the company may agree upon any other

mode of testing. No notice is required. In the original Bill the prescribed dividend on the new shares was 8 per cent.

The *Windsor Royal Gas Act* authorizes the company to increase their existing capital of £33,600 to £70,000, the dividends on the new shares being limited to 7 and 6 per cent. Of the existing capital, £9600 consists of profits expended on the works, which, though capitalized by the Act, the dividend on that portion is limited to 5 per cent., with preference. The standard of illuminating power is 14 candles; the gas to be tested with a Sugg's steatite burner; and the maximum price within the borough 5s. 6d. per 1000 feet, and 7s. beyond. The gas is to be tested for sulphuretted hydrogen, a notice of three hours being required. The charge for lighting the public lamps is not to exceed £3 10s. per annum, including lighting, extinguishing, and repairing, from one hour after sunset to half an hour before sunrise, excepting during four nights at full moon, "when not dull and cloudy." In the Bill before amended there was no special limitation of dividend on the amount of profits capitalized, and the prescribed dividends on the new shares was 8 per cent.; the illuminating power of the gas was to be 13 candles, and the maximum price within the borough 6s. per 1000 feet, and 7s. 6d. beyond.

The *Woolton Gas Act* empowers the company to double their present capital of £6000, the prescribed dividend on the new shares being 7 per cent. The illuminating power of the gas is to be equal to 16 candles, and the maximum price 5s. 6d. per 1000 feet. The gas is to be tested for sulphuretted hydrogen, and without notice. In the Bill before being amended the standard of illuminating power was 12 candles, and the maximum price 7s. 6d. per 1000 feet. No test of purity was prescribed, and six hours notice was required before testing the illuminating power. The company also applied for power to borrow £10,000, but the sum authorized by the Act is only the usual proportion of one-fourth the amount of paid-up capital.

Six Acts were passed giving additional powers to local authorities respecting the supply of gas, of which the following are abstracts, so far as they relate to gas lighting:—

The *Bingley Extension and Improvement Act* confirms an agreement made between the commissioners and the Bingley Gas Company for the purchase of their works for the sum of £19,721, including gas-rents due and everything pertaining to the undertaking, and the commissioners agree to be responsible for all the debts and liabilities of the company, including the sum of £3000 which had been borrowed in excess of the amount authorized. This agreement came into operation on the 1st of July last, and the company is now dissolved. The illuminating power of the gas is to be 14 candles, and it may be tested without notice by order of two justices on the application of five consumers. The degree of purity is not specified, nor is there any maximum price of gas. The commissioners are authorized to borrow £50,000 for the purposes of the gas-works on the security of the gas-rents. In the application of the gas-fund, it is provided that after paying all the expenses of the gas undertaking, and forming a sinking-fund for the discharge of moneys borrowed, the balance is to be carried to the credit of the general account of the commissioners. The formation of the sinking-fund is to commence in January, 1869, to consist in amount of one-fortieth part of all the money borrowed on account of the gas undertaking, and to be continued until the whole is paid. The commissioners are authorized to purchase 5 acres of land for the gas-works. In the original Bill the sum set apart for the sinking-fund was to amount to one-fiftieth part of the money borrowed, and the illuminating power of the gas was not named.

The *Birkenhead Improvement Act* gives extensive general powers to the commissioners, but the only portions which relate specially to the supply of gas are the clauses by which the price is limited in the township of Tranmere, and power is given to raise £19,900 on the security of the gas and water rates. The gas supply of Birkenhead has been for several years in the hands of the commissioners.

The *Heywood Improvement Act* empowers the Local Board to purchase by agreement the undertaking of the Heywood Gas Company, by granting to the shareholders perpetual annuities at the rate of 10 per cent. on the amount of their original capital of £10,000, and 7½ per cent. on their new capital of £20,000. The gas-works and all effects of the company were to be transferred on the 1st of July last, from which day the annuities are to be computed. The gas company are to receive the rents due to them to that day, and to pay all the debts they had incurred. The Local Board may redeem or purchase any of the annuities by agreement. The illuminating power of the gas is to be 14 candles, and the maximum price 6s. 6d., as fixed by the company's Act of 1856. The gas may be tested without notice, on the requisition of five consumers, by order of two justices. In the original Bill a notice of 24 hours was required before testing the gas.

The *Salford Improvement Act*, so far as relates to the supply of gas, merely authorizes the Corporation to purchase additional land for the extension of their gas-works, and to borrow, on the security of the borough rate and gas-works, the additional sum of £100,000.

The *Wallasey Improvement Act* gives power to the Local Board to purchase by agreement additional land for the extension of their gas-works, and to make more effectual regulations for the laying down and fixing of mains and pipes. The maximum price of 14-candle gas is to be 5s. 6d. per 1000 feet. No price nor quality of the gas was named in the Bill as introduced into Parliament.

The *Widnes Gas, Water, and Improvement Act* confirms an agreement made between the Widnes Gas and Water Company and the Local Board for the transfer of their undertaking, the price to be settled by arbitration. The illuminating power of the gas is to be 14 candles, and the maximum price 5s. 10d. per 1000 feet; but it is provided that the Local Board shall not be compellable to supply gas out of Widnes unless a profit of at least 10 per cent. per annum on their expenditure be first secured to them. The gas is not to contain more than 20 grains of sulphur nor more than 5 grains of ammonia in 100 feet; power being given to test its quality at the requisition of five consumers after three hours notice. The Local Board may borrow, on the security of the gas-works, £15,000. A sinking-fund is to be formed for paying off the money borrowed on the gas account in 30 years. The maximum price of gas originally named in the Bill was 6s. 8d. per 1000 feet.

Six Bills were introduced into Parliament for the incorporation of new companies without works, two of which—viz., the Chester Paraffin Light Company and the Gillingham, Brompton, and Rainham Consumers Company, being projects to compete with established companies—were stillborn. The remaining four passed through Parliament, and received the Royal assent, as follow:—

The *Abertillery Gas and Water Act* incorporates a company for supplying with gas and water parts of the parish of Aberystruth, in the county of Monmouth. The capital of the company is to be £8000, in £10 shares, which may be divided into half shares. The standard of illuminating power is 14 candles, and the maximum price of gas 6s. per 1000 feet. No degree of purity is specified, and the gas may be tested without notice. Power is given to the company to sell all their undertaking to, or to amalgamate with, the Brynmawr Gas Company, who are empowered by their Act to supply gas to Abertillery, but have not yet done so; and the Brynmawr Company are authorized by this Act to raise £8000 for the purchase. In the original Bill the standard of illuminating power was 12 candles.

The *Lampeter, Llandyssil, Tregaron, and Aberayron Gas Act* incorporates a company for lighting certain places in the county of Cardigan which are not yet supplied with gas. The authorized capital is £8000, in £10 shares, which may be divided, one half bearing preference at the rate of 6 per cent. The maximum price of 14-candle gas is to be 7s. 6d. per 1000 feet during the first five years, and 6s. 3d. afterwards. The illuminating power of the gas may be tested without notice, the degree of purity not being specified. The committee on the bill raised the standard of illuminating power from 10 candles, as proposed, to 14, and raised the nominal value of the shares from £5 to £10.

The *Risca and Pontymister Gas Act* incorporates a company for supplying gas to certain parishes in the county of Monmouth. The capital of the company is limited to £4000, in £10 shares, which may be divided. The price of 14-candle gas is not to exceed 6s. per 1000 feet, and it may be tested without notice. The illuminating power named in the Bill was 12 candles.

The *Weymouth Consumers Gas Act* incorporates the Weymouth Gas Consumers Company, Limited, with power to purchase the undertaking of the Weymouth and Melcombe Regis Gas Company. The authorized capital is £30,000, in shares of £10, and the company may create and issue debenture

stock. The Act received the Royal Assent on the 20th of June, and it provides that the company shall take possession of the works to be purchased on the 29th of that month; the sum to be paid for the transfer to be arranged by agreement, or by arbitration, and Mr. Burdon, the principal proprietor and sole director of the Weymouth and Melcombe Regis Company, is to receive the gas-rents until the purchase-money be paid. The standard of illuminating power is 14 candles, and the maximum price 4s. 6d. per 1000 feet. The gas is not to contain more than 20 grains of sulphur in 100 cubic feet, and it may be tested at any reasonable time, the committee on the Bill having struck out the six hours notice proposed.

An Act was passed confirming an agreement between the Midland Railway Company and the Derby Gas Company, for the purchase and exchange of lands in the town of Derby and the neighbourhood. The agreement comprises 28 articles, in one of which it is provided that the railway company shall make a siding to the works of the gas company; and it is also provided that, in case of any difference between the two companies with respect to any matters in the agreement, it shall be referred to and determined by Mr. T. G. Barlow. The costs of the Act are to be paid by the railway company.

In all the foregoing Acts the gas companies are authorized to borrow one-fourth of the amount of the capitals to be raised, when the amount is not otherwise stated.

Circular to Gas Companies.

It was to be expected that the report of the committee of the House of Commons on the Metropolis Gas Bill would be a subject for exultation to the special Gas Committee of the Corporation of London, and that they would not fail to take advantage of the alternative proposition—that unless the companies are prepared during the recess to consent to a satisfactory arrangement, every facility should be afforded to the local authorities next session for the introduction of an independent supply. At a meeting of the Court of Common Council, on the 19th ult., the Gas Committee accordingly made a report, the substantial part of which was a reproduction of the report of Mr. Cardwell's committee, and applied for authority to act on it and take steps for prosecuting in the ensuing session a Bill to confer on the Corporation the power of supplying the City of London with gas. Mr. Bontems, the chairman of the Gas Committee, in moving the adoption of the report, made a long and rather clever speech, abounding in fallacies adroitly put together. Some of his fallacies were, however, so glaring that they could scarcely have imposed even on the willing audience to whom they were addressed; for we can scarcely conceive any of the Common Councilmen so stolidly ignorant of the actual facts as to believe that there has been great injury to health and much sacrifice of life by the deleterious quality of the gas supplied by the companies; nor yet that they could be so wanting in the powers of reflection and of computation as to give credit to the assertion that during the last seven years no less a sum than £2,800,000 has been unlawfully taken by the gas companies out of the pockets of the public. The process of calculation on which that assertion is founded does more credit to Mr. Bontems's ingenuity than to his veracity. He said that the gas companies, at the commencement of the agitation, took off 6d. per 1000 feet of gas, which ought never to have been put on, and which amounted to £200,000 a year. In that calculation he assumes that all the metropolitan gas companies raised the price from 4s. to 4s. 6d. after the passing of the Act of 1860, whereas the Imperial Company had maintained their price at 4s. 6d. long after that date, and he omitted to mention that the recent reduction was caused by gradual improvement in the position of the gas companies after the districting arrangements had put a stop to expensive competitions, which increased their profits to more than was required to pay the prescribed dividends. Had the chairman of the special Gas Committee directed his attention to the annual accounts of the metropolitan gas companies, he would have perceived that there has been a rapid increase in the quantity of gas supplied and a corresponding increase in the revenues of the companies since 1860, which have enabled them to realize increased profits; and it is surprising that even he should make it an accusation against them that their undertakings are more prosperous now than they were seven years ago. It is, however, on that ground that his complaints against them are principally founded, and his calculations are based on the supposition that the supply of a smaller quantity of gas must he equally remunerative as the supply of the larger quantity on which the improved revenues of the companies mainly depend. We are quite in accord with Mr. Bontems in that part of his speech wherein he protests against charging local authorities less for gas than private consumers. We are glad to find also that he does not object to the maintenance of the statutory dividend of 10 per cent., and that he disavows any participation in the proposition originally made in the Bill to reduce the dividends to 7 per cent., which he declares to have been unwise and wrong. He several times paid us the compliment of noticing the Journal of Gas Lighting, and quoted several observations to which he attributed additional weight as proceeding from what he called "the organ of the gas companies." That, however, is an honour that we cannot claim, for, though desirous to uphold their interests when unfairly attacked, we have for 18 years frequently advocated a policy distasteful to them, and we have often urged the metropolitan gas companies to amalgamate into one company. We have, indeed, on more than one occasion recently expressed doubt whether the proposed condensation of the thirteen companies into four would not be found merely a half measure, which would leave open the possibility of different prices and different modes of management, and might lead to the renewal of agitation at no distant period. The motion for the adoption of the report was seconded by Mr. Dresser Rogers, and agreed to, notwithstanding a protest by Mr. Elliott against such a course until the report was printed, and an opportunity afforded for considering a recommendation which might lead to the sacrifice of another £5000 in a parliamentary contest.

Another meeting of the stokers was held on Wednesday, at which the committee of the Association of Stokers made a report, to the effect that the directors refused to accede to the demands of the men, and would not receive a deputation or make any alteration in the hours of labour. The meeting was presided over by Mr. G. Brook, a poulterer, who made an exciting speech; and a carpenter also spoke, urging the men to continue the agitation. Two stokers only addressed the meeting, and a resolution was adopted to persevere in the demand for 60 hours labour a week instead of 90. A strike was not recommended, nor was any other course of action indicated.

To the abstracts of the Gas Acts passed during the last session of Parliament, published in our present number, there are appended brief notices of the alterations made by the committees to whom the Bills were referred, from which may be perceived the tendency of the Legislature in their dealings with gas companies. It will be observed that in nearly every instance the illuminating power proposed by the promoters of the Bills has been raised, and that a standard of not less than 14 candles is now adopted. The maximum price has at the same time been reduced. These are onerous conditions to impose on gas companies now that the cost of coal and of other materials of manufacture is increasing, and demands are being made for advance in the rate of wages or diminution in the hours of work. Additional powers have been generally granted to the extent required for the increase of capital, but the prescribed dividends on the new shares to be issued have been limited to 7 per cent., and to 6 per cent. if issued with preference. In two instances, and in two instances only, the plan has been adopted of increasing the prescribed dividends on the new capital when the price of gas is reduced, according to a sliding scale, until they reach 10 per cent. It is satisfactory to find that no encouragement has been afforded for tampering with the statutory dividends of 10 per cent. on the original capitals of the companies; and even in the peculiar case of the Mitcham and Wimbledon Company, which afforded some pretext for intermeddling, the faith of Parliament has been maintained. That company have raised only £30,000 of their authorized capital of £80,000, and they have been allowed to divide 10 per cent. on the remaining £50,000 when the shares are issued, though the prescribed dividend on the additional capital required has been limited to 7 per cent. In a few only of the Acts passed last session are the terms for lighting the public lamps specified, and in those cases it is merely provided that they shall be supplied with gas at the lowest rate charged to private consumers. The provision for estimating the quantity of gas supplied by average meter indication, which was introduced in several Acts passed in 1866, is not once mentioned in those of last session. In most instances the notices required before testing the gas were struck out of the Bills in

committee, or considerably shortened, with two exceptions, in which the long notice of 24 hours was retained. The only two Bills presented to Parliament for the incorporation of new competing companies were thrown out, and so far the Legislature have continued to sanction the principle that existing interests should be protected when no blame attaches to the manner in which gas companies have exercised the powers conferred on them.

Communicated Article.

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GAS AND WATER APPARATUS AT THE UNIVERSAL EXHIBITION OF 1867.

(*From our Special Correspondent.*)

[*Continued from page* 790.]

The gas-meters attract attention in the exhibition of manufactures from nearly every country in Europe. Commencing with France, we notice, in the first place, distinguished by finished workmanship and taste, the objects exhibited by Messrs. J. Brunt and Co. This firm, originally English, was established in 1839, and was the first that made gas-meters in France. Messrs. Brunt and Co. have now branches at Lyons, the Hague, Brussels, Milan, Naples, Venice, and at Madrid, and they employ 250 workmen in making the apparatus they supply. The meter exhibited in the Gallery of Machines is one of the smallest size that is permitted by the prefecture of the Seine to be used, being made to supply 5 burners of the kind prescribed by the prefectural decree of the 5th of April, 1866. The syphon and the regulator are bent in a vessel having a vertical tube which enters the waste-water box. This tube is separated by a diaphragm from the inside of that box, on which the spindle of the drum turns. The meter thus fulfils the following prescribed conditions:—"The examiner having left all the orifices of the meter open, shall ascertain that the float, the syphon, the hydraulic seal of the vertical shaft, and the inlet-pipe for the water are water-tight under a pressure of at least ten centimètres." Among other interesting apparatus exhibited by Messrs. Brunt there are a glass drum, which shows the passage of the gas through the meters; a dry meter, which, though sanctioned by the prefecture, is not much used in France; a testing-meter having an index showing the level of the water inside, and a peculiar dial graduated in 100 parts, each of which indicates the consumption of a litre of gas; an experimental meter, of a very neat pattern, marking the consumption of gas per hour by the observation of a minute, and fitted with a seconds clock; a meter for photometrical observations, such as is used in the testings of the gas in Paris; and, finally, a water meter, arranged in such a manner that the apparatus may be cleaned without interfering in the least with the mechanism of the index. We must notice also the appliances for testing meters; stop-cocks of white metal without friction; pressure indicators which mark on a sheet of paper the variations of pressure during 24 hours; ordinary pressure-gauges; floating pressure-gauges, and others with an index, called multiplying pressure-gauges, which are so graduated that a millimètre of pressure may be indicated by the movement of the hand of at least one centimètre, so that it is easy to see the amount of pressure to the twentieth part of a millimètre. This instrument has been of great use to M. Arson, the chief engineer of the Paris Gas Company, in the remarkable work which he has undertaken on the loss of pressure in gas-mains. The regulator marked at the price of 3·75 francs (3s.) is intended to regulate the consumption of gas in street-lamps, and promises to be generally adopted. It consists of a small metal box, in the inside of which there is a moveable diaphragm, which has attached to its centre a small cone of metal, the action of which is similar to that of common governors. If the gas admitted under the moveable diaphragm have a greater pressure than that to which the apparatus has been adjusted, it raises the diaphragm, and by that action the cone is lifted, the aperture for the passage of the gas is contracted, and the degree of contraction corresponds with the pressure of the gas. The consumption of the burners is regulated to a normal pressure of from 18 to 20 millimètres. The most perfect of the collection of articles exhibited by Messrs. Brunt and Co. is the model, one-third of the size in use, of an experimental gasholder for testing meters, which requires particular care and mathematical precision in the manufacture. It is requisite that it should fulfil two essential conditions—viz., the maintenance of a constantly equal pressure, and of the exact level of the water. To fulfil the first of these conditions, these manufacturers have fixed, at the axis of the large pulley which supports the chain and the counterpoise which balances the weight of the inverted bell, a curved lever of a form determined by calculation. At the extremity of the curve a weight is suspended by a cord, the length of which is equal to the length of the curved surface. The graduated difference in the distance of the points of suspension of the weight on the curved lever, caused by the ascent or by the depression of the bell, balances most exactly that portion which is raised above the water in the tank. To maintain the level of the water a second pulley is fixed on the bar of the gasometer, on which there is a cord that is attached at one end to the upper part of the bell, and the other end of which supports a plunger immersed in the water of the tank. The form of the plunger is so adjusted that every part of its length is equal in volume to the same weight of the metal of the bell, and displaces an equal quantity of water. As the bell descends the weight rises in an equal degree, and thus the level is kept at the same mathematical point without any necessity for letting the water flow out.

Close to the firm of Messrs. Brunt are placed the contributions of Messrs. Siry, Lizars, and Co., which are similar in kind to those already described; such as meters, pressure-gauges, pressure-indicators, and transferers for the testing of meters, which exhibit the care with which these manufacturers finish their goods. In addition to the various kinds of apparatus we have named, these two firms have placed at the disposal of the Imperial Commission two large station-meters, which are erected by the quay on the left of the Pont de Jéna, and intended to be used in the lighting of the park. The cases of these meters, each of which is equal to supply 5000 burners, are made of cast iron, and are provided with valves and pipes, pressure-gauges, &c., as would be required if fixed in a gas-work.

The objects exhibited by Mr. J. Williams, of Paris, represent the complete apparatus required in an office for testing gas-meters. There is to be seen the graduated gasometer, the table, the float, with its pressure-gauges, stop-cocks, india-rubber tubes, and the regulating-meter. The arrangements adopted are most ingenious, and by means of the moveable float, balanced by counterpoises, this apparatus may be conveniently used for testing meters of various sizes from 3 to 150 lights. The meters exhibited by this manufacturer differ from the preceding by being provided with a compensating float—that is to say, with a float exposed at the same time to the pressure of the gas at its inlet and outlet—which obviates the inconvenience arising from the sensibility of the valve, and reduces to 1 per cent. the possible error in measurement caused by the depression of the water level. On two tables there are tastefully arranged, on one side, all the pieces which are employed in the construction of a meter for 10 burners; and on the other side all the brass and copper pieces employed in making meters and the clockwork movements of the indices.

In the Belgian department of the Gallery of Machines are to be seen the meters of Messrs. Dejaifve and Mignot, of Brussels, but they present nothing remarkable. The application of the spirit level on the meter, and of the moveable screws at the bottom, by which the instrument can be easily adjusted to the proper level, are the only changes from the old French patterns.

In the Prussian department, M. Julius Pintsch, manufacturer of meters at Berlin, Dresden, and Breslau, exhibits, in the Gallery of Machines, a collection of all the apparatus he manufactures. It comprises pressure-gauges, regulators, experimental meters, and pressure indicators, arranged round gas-meters of different sizes, the interior structure of which cannot be perceived, but which bear witness to great care and perfection in the manufacture.

M. Elster, of Berlin, makes less display of the products of recent manufacture than of the results of his latest contrivances of experimental apparatus. We have already mentioned his photometers; we shall now first notice a multiplying pressure-gauge, which indicates pressures from 0 to 25 millimètres on a dial magnified ten times, on the principle of a compensating float, which we shall have occasion to revert to when noticing the apparatus of the Gas-Meter Company of London. There is an apparatus for ascertaining the density of gas in the form of a little bell, the action of which depends on the rapidity of its emission at constant pressures; an arrangement according to the plan of M. Ruedorff for ascertaining to 1-100 per cent. the quantity of carbonic acid in gas by absorption by potass; an experimental meter without stuffing-box, to diminish the friction, the dial of which will indicate to the small quantity of the 1-120 of a litre; a small mercurial regulator; a Wright's pressure-indicator which marks on a paper disc the variations of pressure during 24 consecutive hours; and, lastly, an experimental Argand burner, by which the current of air to the interior and exterior of the flame can be regulated at will, thus to produce the maximum illuminating power of gases of the most differing qualities.

In the department of Norway, situated in a building in the park, an experimental gasometer, exhibited by M. Johansen, of Christiania, indicates that there are gas-meter makers in that town. The remarkable models of apparatus for carbonizing wood, exhibited by M. Sandholt, of Drammen, and the abundance of that material in the country, leads to the supposition of the use of wood gas in Scandinavia.

Russia—the original and remarkable exhibitions of which country attract general attention—shows some specimens of gas-meters sent by M. Kurgas, engineer at Riga, which are similar to those we have seen in the Prussian section.

Even Spain is represented in gas industry by Messrs. Ciervo

and Co., of Barcelona, who manufacture meters of sheet iron of different sizes, small meters with cast iron cases, and experimental meters—all being graduated according to English measures.

In the English department, the manufacture of meters is represented by numerous competitors, who show the extent to which the consumption of gas has reached in this country, while indicating, at the same time, the competition which still exists between wet and dry meters.

Wet gas-meters are exhibited by Messrs. Newton and Braddock, Globe Meter-Works, at Oldham. They show the different kinds they manufacture, including a meter for three burners, with a tinned sheet-iron case; a 3-light meter, with a cast-iron case, which is more durable than the former and more easily repaired; and a patent compensating meter, which maintains the water at a uniform level. This meter is said not to require the quantity of water to be adjusted more than once in a year. There is also a model of a station-meter, rather too monumental in design; differential pressure-gauges; and the improved drum, which would be little liable to vary in capacity by the loss of water, and which contributes to the improvements of the meters of this firm.

The London and Westminster Meter Company exhibit a compensating meter on Myers's plan, for maintaining a constant water-level. It has a box in front to serve as a reservoir for water, to supply the place of the water wasted in the meter.

Dry meters are represented by Messrs. George Glover and Co., who have taken advantage of their excellent position in the Gallery of Machines to exhibit by the side of these meters the apparatus for testing them. It would be useless for us to dwell on the construction of dry meters; we need only say that those exhibited by Mr. G. Glover are manufactured with materials of the first quality—the leather is chosen with the greatest care, and specially prepared to resist the action of the gas; all the other parts which come in contact with the gas are made of inoxidizable metal, and the connexions of the mechanism are so combined as to diminish the friction as much as possible. In the standard gasometer the bell is also made of a metal not oxidizable; it is perfectly cylindrical, and every precaution is taken to maintain a constant pressure and a uniform water level. Mr. Glover directs attention also to his thermometers, and to a pneumatometer, or measurer of the capacity of the lungs, by which the physiologist can ascertain precisely the quantity of carbonic acid expelled from the lungs at each exhalation, and test the slight variations which take place in the same individual at different hours of the day and in different seasons of the year. Mr. Defries, who has supplied 250,000 dry meters, adopts the plan of having three diaphragms, and all the details of his meter are exhibited in a very complete manner. Mr. Thomas Glover had no occasion to have recourse to so much display to set off his dry meters, which have acquired a merited reputation. More experienced than this exhibitor—who shows in his compartment two sheet-tin drums completely corroded, which had been made in 1834, in the infancy of the construction of wet meters—the Gas-Meter Company of London, Oldham, and Dublin, have been able to combine in their great undertaking the two branches of the apparatus for measuring gas, and exhibit not only dry meters, but also wet meters, that have an invariable level, and leave nothing to be desired in regard to their correctness and the excellence of their manufacture. In the very complete exhibition of this company's manufactures there is a pressure-generating meter, which increases the pressure by means of a spring or of a weight, as in a clock. It is used to increase the pressure of the gas in the houses of consumers when more pressure is required than a company can give. The gas drawn in by this 10-light meter passes through another 10-light dry meter, and then through a 5-light wet meter of variable level, which is supplied from the two others. In these meters for the usual metallic casing glass is substituted, so that all parts of the mechanism may be seen. The compensating meter was invented by Messrs. Gilbert Sanders and Richard Edward Donovan, of Dublin. It was patented in 1855, and its special object is to prevent, by means of a compensating float, the inconveniences produced by the evaporation of the water. The construction is very simple, and as the compensating float has no connexion with the mechanism of the apparatus, there is no increase of friction. The use of this meter has been greatly extended in England since the passing of the Sale of Gas Act, which requires great correctness in the meters. The dry meter was invented by Mr. Angus Croll and Mr. William Richards, in 1844. Since that time Messrs. Croll, Rait, and Winsborrow have successively introduced improvements in it. The best proof of the value of these meters is afforded by the hundreds of thousands of them at present in use, and the eagerness which all meter makers have shown, since the expiration of the patent, in 1858, to construct this kind of dry meter in preference to others. A large dry meter for 100 lights, of excellent workmanship, and the different pieces of which these meters are constructed, exhibited with great care, enable visitors to perceive exactly the mode of their operation. We also admire in this exhibition a cycloidal water-meter, constructed on a very simple mechanical principle, invented by Mr. Walter Payton, of London.

Correspondence.

WATER AS A LUBRICATOR FOR GAS EXHAUSTERS.

SIR,—Observing a communication from Mr. Esson, of Cheltenham, relative to lubricating exhausters, allow me to say that I used distilled water 15 or 16 years ago for the same purpose, and I know several gas managers that now use it. But I find from expreience that by far the best lubricator is found in purified coal oil —I suppose because "like seeks like." No matter how hard the rollers may have got set, or however much clogged up the exhauster may get, a little of this oil dissolves it immediately, and by its use entirely prevents the clogging of the rollers, and keeps the bearings always cool.

A great advantage is that it is very economical, being purchased at 6d. per gallon; it is also an excellent lubricator for other bearings. J. SOMERVILLE.

Maidstone, Sept. 17, 1867.

SIR,—In the JOURNAL OF GAS LIGHTING, &c., of the 17th inst., you have published an illustration and description of a mode of lubricating gas exhausters with water, furnished by Mr. Esson, of the Gas-Works, Cheltenham, who claims for Mr. Anderson, of the Bath Gas-Works, the credit of having first thought of using this inexpensive material.

For nearly seven years I have used nothing but simple water for lubricating the exhausters in these works, and as I find it the best material for the purpose, after trying many others, it will only be an act of justice that this letter should appear in the next number of your JOURNAL. CHAS. HENWOOD.

Oxford Gas Company's Office, Sept. 23, 1867.

Register of New Patents.

3296.—THOMAS HOEY, of Glasgow, in the co. of Lanark, N.B., engineer, for "*Improvements in arrangements and apparatus for measuring and controlling the supply of water for closets and general uses, and for the deodorization, removal, and utilization of excrementary matters.*"

Provisional protection only obtained. Dated Dec. 15, 1866.

In carrying out this invention, a vessel is provided for containing in readiness and measuring the quantity of water considered requisite for flushing and then sealing the closet-basin, this vessel being filled as usual by a pipe leading down to the basin, and with a valve actuated by means of the ordinary closet-handle. The measuring-vessel is supplied by means of an inlet valve or tap, proportioned so as, when full open, to require a definite time—say, about three minutes—for filling the vessel. The inlet-valve is connected to the discharge-valve, or to the lever or wire actuating it, so as to be closed when that valve is opened. The measuring-vessel is adapted to the bottom of the cistern ordinarily filled in connexion with water-closets, receiving its supply from such cistern. The measuring-vessel may be made with two compartments in this way; or, according to a modified plan, separate measuring-vessels may be provided for flushing and for sealing, their valves being so connected to the closet-handle, that the lifting of that handle will discharge the flushing water, whilst the lowering of it will discharge that for sealing. A single five-way tap may be arranged to effect the actions indicated. On the rod being drawn fully up the catch is thrown out of gear by the contact of a projection and guiding surface, whereupon the rod can descend freely. In measuring and controlling the supply of water for general uses, the tap, cock, valve, or crane, from which the supply is taken, is proportioned so as, when full open, to discharge a definite quantity per minute; and as the quantity so discharged will depend upon the pressure, unless the pressure on the service-pipe is uniform, the supply-pipe must be fed by a cistern with a float-tap to ensure a constant head or pressure. The tap or crane is connected with a piece of clockwork driven by a weight or spring, and is arranged to act on a lever so that such lever will hold the pendulum at one extremity of its swing when the tap is shut.

Another part of the present invention relates to the deodorizing of of excrementary matters, in order to prevent unpleasant and noxious exhalations, and to the removal of exhalations that may notwithstanding occur in water-closets. It is also an object of the deodorizing process hereinafter described to permit of a small quantity of water being used in the closet, with the view of reducing the subsequent cost of evaporation involved in the utilization of the excrementary matters by converting them into dry or concentrated manure. The deodorization is to be effected by means of sulphuric acid added in small quantities to each supply of flushing water used in the closet. A simple and convenient appliance for supplying the sulphuric acid in this way is a small vessel, made like a bird-cage fountain, with a plunger connected with the closet-handle in such a way as to dip into the outlet when the handle is raised. This plunger is made of a size, and is made to dip to a depth, corresponding to the quantity of acid considered requisite at each using of the closet; and a pipe is arranged in connexion with the outlet of the fountain, to convey the acid into the pipe by which the flushing water passes to the basin. Sulphate of iron in solution may be used, instead of sulphuric acid.

In connexion with the arrangements hereinbefore described, it is intended to keep the discharges from water-closets distinct and separate from the refuse water used otherwise, and from rain water; and with this view the closet-soil pipes are led to closed tanks below the pavement in the street, or in any convenient situation. Each tank is to be cleared out by means of an exhausted vessel, forming one of a series of compartments of a travelling tank mounted on wheels, and by simply putting such exhausted vessel into communication with the closed tank with suitable piping. The travelling tanks are for

conveying the excrementary matters to a suitable locality, where there is an establishment comprising any known and economical apparatus for evaporating liquids, and thereby reducing the matters to the state of a dry or concentrated manure conveniently transportable for sale to agriculturists.

3300.—EDWARD MELDRUM, of Bathgate, in the co. of Linlithgow, N.B., esquire, for "*Improvements in the manufacture of gas for illuminating and heating purposes.*" Provisional protection only obtained. Dated Dec. 15, 1866.

This invention relates to a means for producing gas for illuminating and heating purposes from paraffin oil and other similar hydrocarbons, and consists essentially in effecting the decomposition or conversion of such hydrocarbons into permanent gas, by allowing the hydrocarbon, either in a liquid state or in a state of vapour, to come in contact with the charcoal and other carbonaceous matter heated to redness, and contained in an externally heated retort; or to come in contact with charcoal or coke heated to redness by admission of air inside the retort; or by the use of such other arrangement as will admit of the carbonaceous materials being heated to the desired temperature, and the products resulting from the decomposition of the hydrocarbons being collected.

3308.—WILLIAM CLARK, of 53, Chancery Lane, in the co. of Middlesex, engineer and patent agent, for "*Improvements in carburetters.*" A communication. Patent dated Dec. 15, 1866.

This improvement is adapted for positions and conditions where it is not convenient to obtain a blast of air through the carburetter by the constant movement of machinery, and it consists in the provision in connexion with a carburetting chamber and hydrocarbon reservoir of a strong chamber to be filled with compressed air. The air-pump may be a permanent fixture upon it; or the air is forced into the cylinder by stationary machinery. It is particularly adapted for locomotive head lights, railroad and street carriages and coaches, dwellings and lighthouses, and also for generating heat.

3332.—SAMUEL BUXTON, of Hunslet, in the co. of York, contractor, for "*An improved stench-trap.*" Patent dated Dec. 19, 1866.

In carrying out this invention, as applied to a kitchen-sink, a receiver (which may by preference be made of earthenware) of cylindrical form is used, having a branch-tube formed upon its lower end for the purpose of connexion with the pipe from the sink. The lower end of the receiver has the form of a cone, being reduced in diameter for the purpose of connexion with the sink-pipe The internal formation of the upper orifice of the ejection-pipe is adapted (being lined with a seat of copper or other suitable non-corrosive material) to receive a conical plug (also by preference of copper), which fits well into it, and is connected to a wire, which may be of non-corrosive material, and which passes through a hole in the cover placed over the top of the receiver. A float (also by preference of non-corrosive material) is placed upon this wire at a suitable distance from the conical plug before named.

In some cases it is preferred to make the lower portion of the float itself of conical formation, so as to fit into the metallic seat of the ejection-pipe, constituting, in fact, a combined float and plug, the plug portion being ground into the seat, so as to make a good and close fit, in the manner of ordinary water-cocks; or sometimes a conical non-corrosive ring is affixed on the lower portion of the float, which is fitted in like manner to the seat. The branch-tube having, therefore, been fixed to a part of the sink-pipe, in convenient proximity to the sink itself, and the lower part of the receiver connected to the continuation of the sink-pipe, upon water or other fluids, or fluid and solid matters, being admitted down the sink-pipe through the branch into the receiver, the float is raised, and consequently the conical plug. The admitted contents are thus permitted to pass away, the supply ceasing, the plug descending into its place, and stench is prevented.

3336.—MICHAEL HENRY, of 68, Fleet Street, in the City of London, patent agent, for "*Improvements in centrifugal pumps, and in the joints or junctions of pipes and tubes.*" A communication. Patent dated Dec. 19, 1866.

This invention relates to centrifugal pumps consisting of two main portions, one being a revolving wheel in which centrifugal force is developed, and the other is a stationary casing surrounding it. The wheel is divided by helical, winding, helicoidal, or spiral vanes of two or more threads or turns, their curve being generated by two lines, each having one end tangential to the boss of the wheel, and each moving in the direction of its axis in parallel planes, and also in a direction round such axis, so that in their path their point of contact describes a helicoidal curve on the surface of the boss, supposing the boss to be cylindrical. The wheel is thus divided into spiral channels, whereof the surfaces are so inclined that when the fluid is admitted they act upon it and work through it without concussion, and carry it by gentle curves to the periphery, where they leave it in a direction as tangential thereto as may be, the vane terminating in a surface which meets the sides of the wheel very obliquely, and in the line of the generators of the vane, that is to say, at a very inclined curve or acute angle to the sides. The wheel is so constructed that an annular opening is left for the exit of the fluid, such opening being formed by the sides of the wheel it, of course, turns with its vanes, so that the water issues at, or nearly at, right angles to the plane of the wheel instead of in the direction of the plane of rotation. This is done thus:—The outlet side is extended and bent, or formed so as to extend beyond the vanes, and leave between itself and the other side of the wheel an annular or circular opening, parallel or nearly so with the plane of rotation, and the water issues thence. The wheel does not revolve directly in the receiver into which the water is forced, but in a casing in which the wheel turns close to the sides of such casing, but not quite in contact with the same, no packing being required. The pump may have its sides open at the centre, so that air may be withdrawn from one end while the water enters freely at the other. A suction-pump or air-pump may be combined with the centrifugal-pump, and worked by its axis through a worm-wheel or otherwise, with appliances for putting it out of gear at pleasure. It draws the air from the centre of the wheel, and drives it into the force-pipe or elsewhere. An air-pump for extracting or exhausting air may be applied to or combined with centrifugal pumps other than those constructed according to this invention.

3345.—DAVID ALLAN GRAHAM, of the city and co. of Perth, N.B., engineer, for "*Improvements in the construction of steam and water traps, and in the floats and valves for the same; also to some extent applicable to other fluid-regulating vessels for controlling the flow of the fluids passing through them.*" Provisional protection only obtained. Dated Dec. 20, 1866.

This invention consists mainly in a new or improved form or construction of "trap" or vessel and its parts, or float-valve and fittings, for allowing and regulating the discharge or escape of the condensed steam or other water which collects and gravitates to the lower part of steam-pipes, steam-cylinders, and other similar conduits and vessels, without loss of steam, and at or under whatever regular or varying pressure the steam may be at which is contained in such pipes or vessels, and which new or improved "trap" or vessel, as a whole, is more simple, efficient, and economical in its construction and action than such vessels have been as heretofore constructed. The shell or outer case of the "trap" may be of various shapes, to suit convenience or taste, but it is preferred either to be of a hollow spherical form, cast in two parts and jointed together by turned flanges, and screw bolts at the centre, or to be of a cylindrical form vertically, with a hollow semi-spherical bottom, and an annular flange-joint and disc cover at the top; in either case the vessel, being only slightly larger inside than the hollow spherical copper float for opening and closing the outlet-valve, the seat of which valve is turned cylindrically, and tightly jointed and fitted into a socket formed on the centre of the lower half or sphere of the outer case. Directly over the vertical line of this outlet-valve seat a small annular piston-seat is tightly fitted into a socket formed on the upper half of the spherical outer case, or in the disc cover when so constructed.

The hollow spherical float has a vertical tube passing right through its vertical axis coinciding with the axes of the valve and piston seats and the line of motion of the float in rising and falling to open and shut the valve, the lid or cover of which is attached to the lower part of the float and to the tube passing through it, which projecting part of the tube forms the stem of the valve and works through a hole for the purpose in the bridge of the valve-seat, while the small hollow piston, which is made of the same diameter and area as the outlet orifice of the escape-valve, is attached to the upper part of the float and a portion of the tube projecting through it for the purpose, so as to work truly and steam-tight in its seat and form a counter-balance pressure surface tending to lift or open the valve equivalent to that acting on the surface of the lid or cover of the valve tending to close it, whatever the pressure of the steam may be in the outer shell or vessel, and which presses equally in all directions round the hollow spherical float, while the pressure of the air without, which acts on the lower side or surface of the outlet valve-lid, is counter-balanced by the pressure of the air acting up through the open-ended tube (passing through the float) upon the upper end or area of the piston, by a small space formed above it, where a screw-plug is fitted into the socket from the outside, so as to regulate the height to which the valve shall rise off its seat, in proportion to the quantity of water required to be discharged from the outer case.

3347.—WHITMORE BAKER, of Downham Market, in the co. of Norfolk, dentist, for "*Improvements in means or apparatus for lighting fires, which improvements are also applicable to warming apartments, and for other heating purposes.*" Provisional protection only obtained. Dated Dec. 20, 1866.

According to one arrangement of this apparatus, a junction is formed with a gas-pipe by means of a piece of flexible gas-tight tubing applied to one end of a hollow tube, which may be similar in form to a common poker, but with the end opposite to that to which the flexible tubing is attached somewhat spade shaped or flattened, or of other shape or form, and perforated with a number of holes for the escape of the gas for ignition. By inserting this end of the poker with the gas escaping therefrom ignited between the coals or other fuel in a fire-grate, the ignition of the fuel will be effected; or an instrument so arranged may be used to give temporary warmth to an apartment, or for general heating purposes. The perforated end of the poker may be formed to screw on, so that the same poker may have several ends, either of which may be used when desired. A tap is employed to regulate the supply, or the supply may be from a separate elastic and portable chamber containing the gas to be consumed; or, in place of gas, oil or spirit, absorbed and conducted by a suitable fibrous substance, may be used.

3349.—EDWARD DORSETT, of the City of London, for "*Improved arrangements and apparatus for removing or transferring tar or similar materials from one place or receptacle to another.*" Provisional protection refused. Application dated Dec. 20, 1866.

This invention is intended especially for discharging tar from barges direct into receivers or boilers, instead of pumping out the tar by the ordinary pumps, so that it may be conveyed any distance through pipes without having to pass through the working parts of the pumps, as at present is the case. Between the barge or receptacle containing the tar and the receiver, into which it is intended to be transferred, an air-tight vessel is employed, into which the tar is drawn through pipes, and out of which the tar is forced through pipes direct to where it is to be transferred, and in connexion with this air-tight vessel an improved air-pump is employed, so constructed that it will either pump air into or out of the air-tight vessel as required.

3371.—WILLIAM CLARK, of 53, Chancery Lane, in the co. of Middlesex, engineer and patent agent, for "*Improvements in apparatus for*

You are aware that the public have all at once come to look upon those who conduct gas-works in a most unfavourable light, and to begrudge the shareholders their hard-earned dividends. We have been attacked in all directions, and but for that recommendation of one of our Ministers to "rest and be thankful," I do not know what we should do. The only thing for us is to "rest and be thankful" until the storm has gone by, and not attempt any "great leap in the dark." The stokers in some of the metropolitan gas companies have all at once grown so tender that they cannot undergo that amount of heat to which gentlemen in the use of the Turkish bath submit by way of enjoyment. We learn that it is appointed to men that they should labour and earn their bread by the sweat of their brow; but while professional men and others are content with this lot, our workmen who have strong bones and muscles complain and grumble that they have to toil for twelve hours a day, and want to have their time reduced one-third. I shall not stop to ask how they would employ the extra leisure thus afforded them, but I am afraid they would be at a loss how to fill it up. I have asked our secretary, for another purpose, to supply me with the number of hours a day in which our stokers are engaged. I find that out of the twelve hours, their actual labour lasts only six hours, and that the remaining six they have to themselves. We have a retiring-room for their use, and they can devote their time as they choose. We have heard a great deal about the temperature of the retort-house, and I have been making inquiries to ascertain the precise state of the case. In our works at Bell Green, which are thoroughly well ventilated, and where you will see some fine noble specimens of athletes who would make good models for painters, and who do not know what illness is, I find that at the time when the thermometer in the office was at 65°, the thermometer in the retort-house and during the time the retorts were being drawn ranged from 70° to 105°—*i.e.*, about 5° higher than that of a hot bath, and you know men can bear an atmospheric temperature much higher than a temperature of water. I have sat in a temperature of 240° for ten minutes without deriving any harm from it; so that with regard to the question so far as our works are concerned, the objections, of which so much has been made lately, respecting the intense heat and the great sweatings have no foundation in truth. We supply our men with a certain quantity of oatmeal which is made into gruel, so that they supply the amount of moisture from their skins with exceedingly wholesome food, which puts them into the extremely healthy condition in which they appear. Such is the happy condition of our stokers that the shareholders may feel very confident the dividend we offer them to-day is not a dividend extorted from their blood, or even from their sweat. Although from our ordinary sources of profit we are not able to allot the amount of dividend we have been accustomed to do, yet, being provident men, we have a fund to which we can appeal on this occasion, and make up the deficiency. I trust and expect that the outlay we have made upon the works will be such as to place us in a very different condition in the future. We have kept on in the course which we have always adopted in our district—that of reducing the price of gas from time to time, and of supplying gas of the best illuminating power, it being on an average equal to 14 candles. I have now, gentlemen, to move—"That the report of the directors and balance-sheet, confirmed by the auditors, be received, adopted, and entered upon the minutes."

Mr. LIVESEY: I second the motion, for the purpose of making a remark or two. Although you have offered certain explanations as to the reason why the profits for the last half year are less than usual, I differ with you entirely as to the cause of that diminution. You refer to parliamentary expenses as one cause, but I do not find anything charged in the account under that head. There is merely a charge of £100 for "Law expenses;" but, in the corresponding half year of 1866, the "Law charges" were £53, and you debited the account £214 for "Parliamentary expenses," which you wrote off the capital; therefore, that has not reduced your profit on the present occasion. Then you say the extra expenditure has been necessitated by the gasholder accident. Now, if we look at the "Trade charges" in 1866 and in 1867 (and I presume this expenditure would come under that heading), we shall see that that is not the case. The "Trade charges" for the corresponding period of 1866 were £914, whereas last half year they were only £751, or £163 less; so that the expense upon the gasholder has not lessened your profits. To my mind, the real secret is that you have used too much fuel. You spoke of the "diminished value of products;" I think the proper terms would be "diminished receipts for products," for, if we are to be guided by what we see announced every week as the price of the Crystal Palace Gas Company's coke, I can only say it is always above what I sell my coke for, and yet we have made during the last half year 10 per cent. more than you have done for products. There is a falling off here of 8 per cent. as compared with last year, and, if you had received that 8 per cent., which amounts to £690, you would have had no occasion to appropriate the sum of £400 from the contingent-fund. This account wants looking into, for I do not think the deficiency of profit arises from the deficiency in the value of products. I believe you have had a fair value as compared with other companies, but you have not sold so much. Then, again, under the head of "Lime and oxide," you have charged £175, which is equal to 2 per cent. I should like to know whether that includes labour.

The SECRETARY: Yes.

Mr. LIVESEY: Well, that is 2 per cent. Very few companies pay more than 1½ per cent., and there is no reason why you should pay more.

Mr. H. P. STEPHENSON: There is no labour included in it.

Mr. LIVESEY: Then it is worse still. You are something like 100 per cent. worse than other companies. You can buy oxide the same as they can, and you have the same opportunities for getting lime; therefore there is no excuse for this excess. Then I find that the "Bad debts" have increased over the half year ending at Christmas by 75 per cent., and that, too, with a falling off in the expenditure in coal. You have not expended so much in coal by £440, therefore you have not made so much gas, and yet your bad debts have increased 75 per cent. The next item is the retort account, which is rather an extraordinary one. I find at Christmas, 1865, you charged to retort account £250; at Midsummer, 1866, £300; at Christmas, 1866, £250; and in this account £250. If these items are intended for wear and tear of retorts, it is most extraordinary that the amount should be always about the same. It must be a mere estimate. There are some gentlemen here who know what the wear and tear is, and they will tell you that it cannot be always the same. On the other side of the account in the balance-sheet you have an item of "Retort account, £1466." I should like to know whether that means stock, or whether it is the value of the settings. It has increased quite 100 per cent., because at Midsummer, 1866, it was only £735. Then, with reference to the balance of profit, although the company appear to do as well, or, as I have heard it said, better than any other company in London, I should say that if the capital had been raised on the same principle as that of other companies—*i. e.*, if it had not been exceptionally raised—you would be doing about the worst, for the profit on the last year, from Midsummer, 1866, to Midsummer, 1867, on the whole amount of capital raised is not quite 6 per cent. So that you have the appearance of doing better than any one else, because the first half of your capital pays only 6 per cent. No other company ever raised capital under 10 per cent., except from compulsion; and, therefore, you appear to do better, though in reality you are not doing so well. Then under the head of "Gas-rental," I see you sum it all up in one item; but I think it is desirable you should put down so much as the rental for the Lady Day quarter, and so much for the Midsummer quarter. We should then be able to understand the items in the balance-sheet better, "Private rental and arrears" and "Public rental and fitting arrears." The amount due for rental and arrears appears to be £8773. Of this I estimate about £5500 for the Midsummer quarter; and, if so, the arrears amount to £3773, which is very heavy, and shows a want of exertion on the part of the collectors. With a rental considerably more than double, the company adjoining yours had not, at the same period, one-third of this amount as arrears, the quarterly collection generally amounting to 96 to 98 per cent. on the amount given to collect. Then, turning to the item "Amount due from sundry persons, £4283," I can only suppose that means debtors for products, or sundry matters. The latter must be very small, and the amount owing for products ought not to be anything like this. You have jumped up nearly £3000 in the last twelve months. In my company it is not one-half of this. Then under the head of "Capital," I think you should be more careful. You have raised £40,000 since Christmas, 1865. You have expended in the same time £24,000, and have only increased to the extent of £1300 the coal carbonized. Now, unless that expenditure will carry you over the next four or five years, I think it is most extravagant; instead of £1300 your increase in coals carbonized ought to have been something like £5000 for such an outlay. Then I should like to know how it is you have got such a heavy stock as £7008. With reference to capital, you appear to have raised in shares and loans £161,361, and to have expended £152,951, leaving only £8410 for working capital. Now, according to this account, you require £23,000 for working capital, and cannot do your business properly for less than £20,000. The way you now do it is by working on the debts due to other people—£14,224—and I say you ought to have more capital to work the concern with, unless you can get your arrears in better. The only working capital you have is sunk in the stock, and you have not a penny to cover your debts and gas-rental. According to my calculation, these accounts are gradually falling off. I see that the profit for the half year ending Christmas, 1865, was equal to 4·12; the next half year it was 3·31; the next 3·38; and now it is only 3·0; so that you are gradually falling off, and I have no doubt if I went further back it would be still more apparent. You lose sight of the fact, because you can make 10 per cent. upon £50,000, and only have to pay 6 per cent. on another £50,000, that you are not doing so well as you might do and as you have done hitherto.

Mr. H. P. STEPHENSON: I feel quite sure that we are all very much obliged to Mr. Livesey for the manner in which he has pointed out these things to the directors, but he must not assume that because he has thus pointed them out the directors have not already had their attention turned to them. There are many of the points which he has brought before the meeting which I have no hesitation in saying are perfectly correct, and I can assure the shareholders that they have received our most serious attention and the attention of our engineer and manager; and first I should like to say one word with reference to what fell from our chairman as regards the dissatisfaction existing among the stokers of the metropolis. It is right the shareholders should know that there is no dissatisfaction among the men in our employ. They have always worked in the most satisfactory manner with us and our officers, and I hope they will continue to do so. As regards the parliamentary expenses and the cost of repairing the great gasholder, Mr. Livesey is quite correct in saying that nothing has been charged in the present half year's accounts under these heads; but the way in which the accident to the gasholder affects our profits is this. It occurred at a very important time of the year—I think it was at the end of January—when we were supplying a very large quantity of gas. Our manufactory was consequently disarranged for something like ten days or a fortnight, and we lost, of course, all the gas that was in the holder, which was a large one. We also lost a large amount of rental during the fortnight, and we were put to a considerable expense for extra labour and fuel at that time. All these things operated upon our accounts during the heaviest portion of our lighting, and therefore seriously affected our profits. Then, again, as regards the coke, Mr. Livesey is quite correct; we have not sold so much per ton of coals carbonized as we have previously done. I think the average of our previous half years has been a sale of something like 10½ sacks* of coke per ton of coals carbonized. During the last half year it has been only 8½ sacks per ton: that is a loss of 2 sacks per ton. At the same time I may say this, that when I speak of 10½ sacks per ton, I speak of the time when we were using a coal which produced a very large amount of coke. Mr. Livesey will know the kind I refer to—the "West Wear" coal—which produces a larger amount of coke, and a stronger coke as fuel. I have already mentioned that the item "Lime and oxide" does not include labour, and I quite agree with Mr. Livesey that the £175 is a large amount. As regards our collection, the amount in arrear at Midsummer was about £2000, but we have lately put our collectors on a new system, and they are now collecting 90 or 92 per cent. of their charge. We have also an arrear collector, and the collection is taken out of the hands of the collectors at the end of the quarter and placed in his hands. I believe the only reason why the bad debts have increased this half year is that the general depression existing has extended to our district, and we are suffering in common with other persons. It is no doubt true that the amount of capital spent is large. We have hitherto on many occasions made small extensions, but during the last two years or so our rental has been increasing largely, and while we have lately been reducing the price of gas considerably, we have been making, for us, some rather large extensions. Indeed, at the present time we have, I think, something like £15,000 invested in works which have not been brought into profitable use. Our rental is increasing at the rate of £4000 or £5000 per annum, and we are in such a position that, with the exception of an outlay which may be required for retorts, we shall probably not require any heavy expenditure for the next four or five years. As regards our profit, there is no doubt that it has been declining, partly from the increased cost of coal, and partly, as we have told you in previous reports, from the reduced value of products. Some years ago we were getting £14 per ton for sulphate of ammonia, now we cannot get more than £10. The price which Mr. Livesey referred to as that at which we are selling coke is our retail price; our wholesale price is much lower.

Mr. LIVESEY: I have only a retail price at my works, and yet I make 10 per cent. more.

Mr. STEPHENSON: You may be able to get rid of all your coke at the retail price, but we are not able to dispose of any large quantity in that way. We have made a large contract for our coke at 6s. or 7s. per chaldron.

* A sack is 3 bushels.

Mr. LIVESEY: That is a very great sacrifice, and is not at all necessary. I have been connected with the manufacture of gas for nearly 50 years, and I have never before heard of coke being sold at 6s.

Mr. STEPHENSON: I only know that if we can get a higher price we shall be very glad to do so. The retort account mentioned in the balance-sheet represents the value of our retorts unset and the value of the retorts set.

Mr. LIVESEY: The large amount due to sundry persons, what does that consist of?

Mr. STEPHENSON: That arises in this way: we have lately changed our system of charging the main account. Formerly, if we took up a 2-inch main and laid down a 4-inch main we charged the latter to capital, but upon considering the question we thought this was an incorrect method of conducting our business. We now charge the 4-inch main to capital, but we debit revenue with a suspense account for the value of the 2-inch main that we took up. We have therefore some mains suspense account which have gradually to be liquidated out of revenue.

Mr. LIVESEY: I am aware I said this, but perhaps it would be better to leave it out. I cannot understand how taking up an old main and putting down a new one can be represented by "Amount due to sundry persons." That ought not to be an asset, and yet you take credit for this sum as an amount due to you.

Mr. LINDING: It must be so; it is an asset, and must so appear in our accounts.

Mr. LIVESEY: It has accumulated from £1100 to £4200 in twelve months.

Mr. LINDING: We could not possibly write off the whole amount in one half year; it would swamp our dividend. To my mind it is a healthy state of things, for, instead of charging it to capital as other companies do, we charge it against wear and tear and revenue.

Mr. LIVESEY: I differ with you as to the practice of other companies. If they take up a small main and put down a large one, they charge the difference only to capital. You do not mean to tell me that you have taken up so many small mains and put down larger ones in the last twelve months, that the difference is between £2000 and £3000?

Mr. LINDING: There is an arrear account for the repair of the gasholder and other things.

Mr. LIVESEY: The repair of the gasholder would be on the other side, and not under the head of "Sundry debtors." That amount would be due to sundry creditors.

Mr. LINDING: It is very difficult for the directors to go through figures in this way at the meeting of the shareholders, but, if you will come down to the works, we will give you every explanation.

Mr. LIVESEY: I have no doubt you will, but I did not expect the directors could give these explanations; the secretary and the engineer are here, and ought to be able to answer them.

The CHAIRMAN: We are all very much obliged to Mr. Livesey for his suggestions, and we shall endeavour to profit by the lessons he gives us. We regret that we have not such long heads as he has for turning coal into gold. We should like to have the district which he supplies, where coke can be got rid of at retail price. Our lot is cast in a neighbourhood where the use of coke is very limited, and where, therefore, it is very difficult to sell it at retail price.

Mr. HADLAND: What is the amount of the quarter's rental to Midsummer?

The SECRETARY: I have not got it stated here separately.

Mr. HADLAND: I thought you collected so closely that you could easily tell.

The SECRETARY: The arrears are about £2000.

Mr. HADLAND: Then the rental for the quarter is about £4000?

The SECRETARY: Yes.

Mr. LIVESEY: Allow me to suggest that for the future you should put the two quarters separately; then we can tell at once what the amount of the arrears is.

Mr. STEPHENSON: It is not usual, but there is no objection to do so.

Mr. GRAFTON: Mr. Livesey has made an objection to the raising of so large an amount of capital at 6 per cent. I think that is one of the wisest steps which have been taken by our directors. If you had issued the second capital at 10 per cent., you would have had 4 per cent. more to pay upon it than you now have. At the same time I think there is a very large amount of capital raised, and that there is a great disproportion between the capital and the income of the company. No doubt that has arisen from the facility you have had in raising the money, and consequently from the temptation to incur large expenditure to meet the growing wants of your district. But then I know, from my experience during the last twenty or thirty years, that the demand for gas doubles every ten years, and that you will have to raise still further capital to make future extensions of works. I was glad to hear Mr. Stephenson say that you are still in advance, and that a comparatively small outlay will enable you to meet the wants of your customers. I was very sorry to hear of the accident to the gasholder, and the expense which the company were thereby necessarily put to; but then, as you have added a railway siding which brings the coals into the retort-house, the loss on the gasholder is more than compensated.

The motion for the adoption of the report was put and carried.

Mr. GRAFTON: I have now to move—"That a dividend at the rate of 6 per cent. per annum on the preference capital, a dividend at the rate of 10 per cent. per annum on the original capital, and a dividend at the rate of 7 per cent. per annum on the ordinary 7 per cent. capital, all free of income-tax, be now declared and made payable forthwith."

Mr. HADLAND: I second the motion, and with reference to the last remarks made by Mr. Livesey, I expect the item represents debts due to the company, and that it is not in any way a part of the suspense account. If it is so made up, I think in future reports it should be separated, and that it should be directly stated whether it is a debt due to us or a suspense account.

The motion was put and carried.

Mr. HYDE moved—"That the thanks of this meeting be given to the directors for their able management of the affairs of the company for the past half year."

Mr. GRAFTON seconded the motion, which was carried unanimously, and acknowledged by the chairman.

Mr. HEWES moved—"That the thanks of this meeting be given to the auditors and officers of this company for the efficient discharge of their duties."

Mr. A. WILLIAMS seconded the motion, which was carried unanimously.

Mr. GRAY, one of the auditors, acknowledged the vote.

On the motion of the Rev. G. POCOCK, a cordial vote of thanks was presented to the chairman, and the proceedings terminated.

COUNTY AND GENERAL GAS CONSUMERS COMPANY, LIMITED.

The Twentieth Ordinary General Meeting of this Company was held at the Office, St. Bene't Place, Gracechurch Street, on Thursday, Sept. 26—E. H. J. CRAUFURD, Esq., M.P., in the chair.

The SECRETARY (Mr. R. S. Parker) read the advertisement convening the meeting, after which the following report and statements of account were submitted:—

The directors beg to submit the balance-sheet and accounts for the half year ending June 30, 1867.

After making provision for bad debts, and for all office and working expenses, the revenue account shows a gross profit of £1172 0s. 10d., which, with the unappropriated balance of £46 17s. 2d. from the last account, makes a total of £1218 18s.

Of this sum £897 13s. 6d. has been absorbed by interest on loan capital, and £305 has been applied towards the reduction of the several items of expenditure which fall to be liquidated out of revenue, as shown in the annexed profit and loss account, leaving a balance unappropriated of £16 4s. 6d. to be carried to the current half year.

The directors have also the pleasure of stating that negotiations are being concluded for a lease of the Pater and Pembroke Works, on terms which they believe will prove advantageous to the company.

Dr. *Balance-Sheet, June 30, 1867.* *Cr.*

CAPITAL AND LIABILITIES.				PROPERTY AND ASSETS.			
Capital—				Property held by the company—			
Received from sundry shareholders, viz.:—				Freehold buildings and plant		£31,835 5 8	
£5 per share on 5827 ordinary shares	£29,135 0 0			Leasehold ditto ditto		27,877 18 9	
£5 per share on 2000 preference shares	10,000 0 0			Stock in trade at sundry works		2,763 10 5	
		£39,135 0 0		Office furniture and fittings		90 0 0	
							£62,566 14 10
Debts and liabilities—				Items of expenditure to be liquidated out of revenue by instalments—			
Debentures and loans	£18,591 16 2			Preliminary expenses	£ 900 0 0		
Mortgages on sundry works	8,016 13 4			Parliamentary ditto	250 0 0		
Tradesmen and sundries	1,072 2 2			Chertsey (loss account)	500 0 0		
Acceptances for goods supplied	1,022 2 4					1,650 0 0	
		28,702 14 0		Debts due to the company—			
Profit and loss		16 4 6		Gas and meter rentals	£2,927 2 1		
				Sundries	520 3 3		
						3,447 5 4	
				Cash—			
				Cash at bankers	£ 182 12 3		
				Petty cash—balance in hand	7 6 1		
						189 18 4	
		£67,853 18 6					£67,853 18 6

Dr. *Profit and Loss Account.* *Cr.*

To Coals carbonized	£2,391 14 7			By Balance from June 30, 1866		£ 46 17 2
Lime and purifying materials	74 13 3			Gas-rental	£4,929 9 10	
Wages and labour	863 8 3			Meter-rental	183 2 2	
Rent of sundry works	81 13 4					5,112 12 0
Local rates and taxes	158 1 1			Coke made for sale	£ 653 8 1	
Agency and collection	78 15 9			Sundry products	22 0 0	
Miscellaneous and petty charges at works	159 9 0			Tar	102 13 2	
Travelling expenses	42 18 8			Sundries	35 14 3	
Retorts	112 4 8					813 15 6
Allowances and discounts	17 0 9					
Bad debts	71 0 7					
Wear and tear	66 9 6					
		£4,117 9 5				
Office expenses, including directors and auditors fees, rent of offices, salaries, petty expenses, printing, stationery, and advertising		636 17 3				
Interest account		897 13 6				
Sundries written off the following account—						
Furniture account	£5 0 0					
Chertsey loss account	300 0 0					
		305 0 0				
Balance unappropriated		16 4 6				
		£5,973 4 8				£5,973 4 8

The CHAIRMAN, in moving the adoption of the report, said the accounts fully disclosed the state of the company, and he thought upon the whole they would be considered satisfactory.

Mr. CRANEY: Not very satisfactory.

The CHAIRMAN said the honourable proprietor would have an opportunity to state his objections presently. The result of the half year's working of the company was a gross profit of £1172 as against £1146 for the corresponding period of 1866. The increase in the profit had not been so

producing a draught in furnaces, and for purifying the smoke therefrom." Patent dated Dec. 21, 1866.

Many attempts have been made to prevent the dispersion into the atmosphere of the black smoke produced by the combustion of fuel in furnaces, and various combinations of apparatus have been tried and proposed, without, however, answering the purpose entirely, and even if partially successful in some cases, it has been at the expense of the fuel, at the same time increasing the liability to accident.

This invention relates to apparatus for attaining the desired result in a perfect, economical, and available manner. This apparatus intercepts the smoke, which would otherwise pass into the atmosphere in a highly heated state, as near as possible to its point of production, and transforms it into a white vapour, which condenses in the air without disengaging any black particles. The apparatus consists, first, of a reservoir formed of metal, masonry, or otherwise, of an extent in proportion to the amount of smoke to be intercepted and divided into two compartments for the inlet and outlet of the smoke. Secondly, of cylinders provided with water-joints of a circular or other form, each provided with two valves—one for the suction, the other for the discharge; these cylinders are worked alternately by means of a beam, or other means of transmission, driven by a steam-engine or hand power. Thirdly, of a metal or other receiver containing small coke or other separating matters, supported on a grating, into which matters water is injected from above. The smoke, after passing through about 8 inches of water under the grating traverses the coke or other matters containing water as above mentioned, where it becomes separated from the unconsumed parts, and is discharged into the atmosphere from the receiver in the form of a white vapour like steam, at a greater or less height, or it may be condensed by refrigeration, in order to extract any remaining products of combustion, or used for any heating purpose. By reason of the exhausting action of the cylinders mounted on the reservoir which is in communication with the furnace flues, the products of combustion are withdrawn, and a vacuum being created more or less partial, a quantity of air passes down through the grating for maintaining and increasing the combustion—in fact, the exhausting action causes the smoke to pass to and fro above the fire, creating long flames, whereby a portion of the smoke is consumed.

3372.—William Clark, of 53, Chancery Lane, in the co. of Middlesex, engineer and patent agent, for "*Improvements in screw-valves.*" A communication. Patent dated Dec. 21, 1866.

This invention consists in constructing a valve in such a manner that it may be adapted to various purposes, and its main feature is the manner in which it is packed or in the recess which contains the packing. The valve, in all cases, is operated by a screw.

3401.—William Bradburn, of Wednesfield, Wolverhampton, in the co. of Stafford, artificial manure manufacturer, for "*Improvements in treating excrementitious matters and other refuse matters for the purpose of obtaining valuable products therefrom, and in apparatus to be employed for that purpose.*" Patent dated Dec. 28, 1866.

This invention consists in the drying or decomposing in the manner described of excrementitious and other refuse matters, and in collecting the volatile matters driven off, and in applying the products of such drying or decomposition either direct to the manuring and irrigation of land, or to the manufacture of artificial manures. The description of the apparatus employed for the purpose would not be intelligible without the aid of drawings.

3405.—William Clark, of 53, Chancery Lane, in the co. of Middlesex, engineer and patent agent, for "*Improvements in valves.*" A communication. Patent dated Dec. 28, 1866.

This invention consists in the employment of a pair of metal plates or discs, fitted in a box or shell in such manner as to close against seats with their outside faces when the plates or discs are moved forward by means of a wedge introduced between them, which opens and spreads the valve-plates, and presses them against their seats, and they also open and recede from their seats when the plates or discs are moved backward by the same means, thus acting as a double valve, which completely and positively closes a passage way on both sides when in one position, and when in another position leaves the passage way clear of all obstruction, with an undiminished area for the direct inlet and outlet of the full volume of steam, water, or other fluid or gas which may be conveyed to the passage.

3409.—William Henry Cutler, of Eton, in the co. of Bucks, civil engineer, and Thomas Brown, of Grove Villas, Victoria Park, in the co. of Middlesex, civil engineer, for "*Improvements in cocks for stopping and regulating the flow of steam, water, and other fluids.*" Provisional protection only obtained. Dated Dec. 28, 1866.

This invention relates to cocks whose apertures or passages are closed by a valve instead of the ordinary conical plug, and consists, chiefly, in constructing the said valve with a flat surface fitted to bear upon a hollow or cup-shaped seat, or in making the said valve in the form of a cup-shaped seat, or in making the said valve in the form of a cup or basin whose edges fit evenly upon a flat seat or face.

3411.—Henry Bollman Condy, of Battersea, manufacturing chemist, for "*Improvements in the manufacture of chlorine, and in preparations for evolving chlorine for disinfecting and other purposes.*" Provisional protection only obtained. Dated Dec. 28, 1866.

In order readily to prepare chlorine either for the purpose of disinfection or for use in manufacturing operations, a mixture of permanganate of soda, or other soluble permanganate, common salt, or other suitable chloride and sulphuric acid, is employed. It is preferred to prepare a mixture consisting of, say, 1½ lb. of common salt and 1 gallon of permanganate solution of ordinary commercial strength. To this preparation, when it is required for use, commercial sulphuric acid is to be added in the proportion of equal parts. On this mixture being made, chlorine is liberated; the chlorine, however, is not suddenly evolved, but is given off gradually for a considerable time, a circumstance very favourable to its use as a disinfectant.

3424.—Charles Harrison, of the city of Manchester, in the co. of Lancaster, machinist, for "*Improvements in cocks or valves.*" Patent dated Dec. 29, 1866.

This invention relates to cocks or valves for regulating the transmission of fluids, steam, air, and gases, and the object is to obtain a much greater area or passage through the cocks or valves in proportion to their sizes and weights of metal than in cocks or valves of the ordinary construction. The plug of each cock or valve is made hollow, with a transverse bridge or stop in the middle, and forms screws when required at each extreme end of the plug for uniting it to the pipes of supply and discharge. At each side of the bridge two apertures are made opposite each other, and on the plug a barrel is fitted having two opposite chambers, each opening over the bridge with their edges agreeing with the apertures in the plug, and when required the barrel and chambers are in connexion with a disc or handle wheel. The pipes of supply and discharge are always open to the ends of the plug, and when the barrel is in such a position that the chambers are full open to the apertures there is a free passage through the cock or valve; but when the barrel is turned so as to place the openings of the chambers on the plain part of the plug between the apertures, the passage is entirely closed, and all areas of passage between the full open and entirely closed are regulated by turning the barrel and causing the chambers to be more or less open to the apertures in the plug.

APPLICATIONS FOR LETTERS PATENT.

2621.—Alexander Melville Clark, of 53, Chancery Lane, in the co. of Middlesex, for "*Improvements in valve closet apparatus, part of which is applicable for regulating the flow of water in other cases.*" A communication. Sept. 17, 1867.

2629.—Richard Watson, of Liverpool, in the co. of Lancaster, fireproof safe manufacturer, for "*Improvements in apparatus for distributing gas for heating and lighting.*" Sept. 19, 1867.

2643.—Louis Lenzberg, of Oxford Street, in the co. of Middlesex, gas engineer, for "*Improvements in gas-lamps and burners for the same.*" Sept. 20, 1867.

2665.—Angus Mackensie, of Capel Street, Dublin, plumber, and Samuel Robinson, of Brunswick Street, Dublin, foreman builder, for "*Improvements in apparatus to be applied to cisterns for preventing waste of water.*" Sept. 21, 1867.

2668.—Adam Aitchison, of Wilton Terrace, Peckham, gas engineer, and Henry John Grantham, of Dockhead, Bermondsey, both in the co. of Surrey, for "*Improvements in the production of carburetted gas, and in the apparatus and burner applicable thereto.*" Sept. 21, 1867.

2674.—Charles Ritchie, of Brixton, in the co. of Surrey, gentleman, for "*Improvements in apparatus for regulating automatically the supply of gas, air, and water, or any one or more of them, to steam-boilers heated by gas or otherwise, and for utilizing the heat of the gases produced or heated by combustion.*" Sept. 23, 1867.

2677.—William Cooke, of 24, Jermyn Street, St. James's, in the co. of Middlesex, for "*Improvements in apparatus for the regulation of up and down currents of air.*" Sept. 23, 1867.

2686.—Hugh Forbes, of 184, Euston Road, N.W., parish of St. Pancras, in the co. of Middlesex, for "*Improvements in the construction of rotary pumps.*" Sept. 24, 1867.

2688.—George Batcheldor, of Liverpool, in the co. of Lancaster, cement manufacturer, for "*Improvements in trough water-closets.*" Sept. 24, 1867.

2691.—Philip Howard Colomb, of Harrow, in the co. of Middlesex, commander in the Royal Navy, and Francis John Bolton, of Rochester, in the co. of Kent, captain in Her Majesty's army, for "*Improvements in the production of light and heat for signalling and other purposes.*" Sept. 24, 1867.

2692.—Thomas Henry Williams, of 20, Cecil Court, St. Martin's Lane, in the parish of St. Martin, in the co. of Middlesex, for "*The improvement of gas-burners.*" Sept. 24, 1867.

2694.—Charles Denton Abel, of 20, Southampton Buildings, Chancery Lane, in the co. of Middlesex, patent agent, for "*A new or improved method and apparatus for converting the gaseous products of combustion into combustible gases.*" A communication. Sept. 25, 1867.

2698.—James Musgrave, of Belfast, in the co. of Antrim, Ireland, for "*Improvements in fittings for cow-houses, saddle-rooms, and stables, the ventilators of the latter being also suitable for other apartments.*" Sept. 25, 1867.

2700.—George Clayton and William Marbeck, both of Leeds, in the co. of York, for "*Improvements in water-meters.*" Sept. 25, 1867.

2701.—William Woodcock, of Pimlico, in the co. of Middlesex, engineer, for "*Improvements in apparatus or arrangements for warming and ventilating buildings.*" Sept. 25, 1867.

2703.—Alfred Rooker, of East Street, Lamb's Conduit Street, in the co. of Middlesex, engraver, for "*Improvements in taps for beer-casks and other vessels.*" Sept. 25, 1867.

2716.—George Wilkinson, of St. Leonard's Road, Bromley, in the co. of Middlesex, for "*Improvements in pumps.*" Sept. 26, 1867.

2718.—John Brunton, of 37, Kensington Park Gardens, Notting Hill, in the co. of Middlesex, for "*Improvements in machinery for raising water.*" A communication. Sept. 26, 1867.

GRANTS OF PROVISIONAL PROTECTION.

2435.—Walter Christopher Thurgar, of the city of Norwich, surgeon, for "*Improvements in apparatus for regulating the supply of gas to burners.*" Aug. 26, 1867.

2536.—Emile Hubner, of 13, Rue Gaillon, Paris, in the empire of France, engineer, for "*An improved rotary steam or gas engine, also applicable for pumping and measuring liquids.*" Sept. 7, 1867.

2548.—Clinton Edgcumbe Brooman, of the firm of Robertson, Brooman, and Company, of 166, Fleet Street, in the City of London, patent

conveying the excrementary matters to a suitable locality, where there is an establishment comprising any known and economical apparatus for evaporating liquids, and thereby reducing the matters to the state of a dry or concentrated manure conveniently transportable for sale to agriculturists.

3300.—Edward Meldrum, of Bathgate, in the co. of Linlithgow, N.B., esquire, for "*Improvements in the manufacture of gas for illuminating and heating purposes.*" Provisional protection only obtained. Dated Dec. 15, 1866.

This invention relates to a means for producing gas for illuminating and heating purposes from paraffin oil and other similar hydrocarbons, and consists essentially in effecting the decomposition or conversion of such hydrocarbons into permanent gas, by allowing the hydrocarbon, either in a liquid state or in a state of vapour, to come in contact with the charcoal and other carbonaceous matter heated to redness, and contained in an externally heated retort; or to come in contact with charcoal or coke heated to redness by admission of air inside the retort; or by the use of such other arrangement as will admit of the carbonaceous materials being heated to the desired temperature, and the products resulting from the decomposition of the hydrocarbons being collected.

3308.—William Clark, of 53, Chancery Lane, in the co. of Middlesex, engineer and patent agent, for "*Improvements in carburetters.*" A communication. Patent dated Dec. 15, 1866.

This improvement is adapted for positions and conditions where it is not convenient to obtain a blast of air through the carburetter by the constant movement of machinery, and it consists in the provision in connexion with a carburetting chamber and hydrocarbon reservoir of a strong chamber to be filled with compressed air. The air-pump may be a permanent fixture upon it; or the air is forced into the cylinder by stationary machinery. It is particularly adapted for locomotive head lights, railroad and street carriages and coaches, dwellings and lighthouses, and also for generating heat.

3332.—Samuel Buxton, of Hunslet, in the co. of York, contractor, for "*An improved stench-trap.*" Patent dated Dec. 19, 1866.

In carrying out this invention, as applied to a kitchen-sink, a receiver (which may by preference be made of earthenware) of cylindrical form is used, having a branch-tube formed upon its lower end for the purpose of connexion with the pipe from the sink. The lower end of the receiver has the form of a cone, being reduced in diameter for the purpose of connexion with the sink-pipe The internal formation of the upper orifice of the ejection-pipe is adapted (being lined with a seat of copper or other suitable non-corrosive material) to receive a conical plug (also by preference of copper), which fits well into it, and is connected to a wire, which may be of non-corrosive material, and which passes through a hole in the cover placed over the top of the receiver. A float (also by preference of non-corrosive material) is placed upon this wire at a suitable distance from the conical plug before named.

In some cases it is preferred to make the lower portion of the float itself of conical formation, so as to fit into the metallic seat of the ejection-pipe, constituting, in fact, a combined float and plug, the plug portion being ground into the seat, so as to make a good and close fit, in the manner of ordinary water-cocks; or sometimes a conical non-corrosive ring is affixed on the lower portion of the float, which is fitted in like manner to the seat. The branch-tube having, therefore, been fixed to a part of the sink-pipe, in convenient proximity to the sink itself, and the lower part of the receiver connected to the continuation of the sink-pipe, upon water or other fluids, or fluid and solid matters, being admitted down the sink-pipe through the branch into the receiver, the float is raised, and consequently the conical plug. The admitted contents are thus permitted to pass away, the supply ceasing, the plug descending into its place, and stench is prevented.

3336.—Michael Henry, of 68, Fleet Street, in the City of London, patent agent, for "*Improvements in centrifugal pumps, and in the joints or junctions of pipes and tubes.*" A communication. Patent dated Dec. 19, 1866.

This invention relates to centrifugal pumps consisting of two main portions, one being a revolving wheel in which centrifugal force is developed, and the other is a stationary casing surrounding it. The wheel is divided by helical, winding, helicoidal, or spiral vanes of two or more threads or turns, their curve being generated by two lines, each having one end tangential to the boss of the wheel, and each moving in the direction of its axis in parallel planes, and also in a direction round such axis, so that in their path their point of contact describes a helicoidal curve on the surface of the boss, supposing the boss to be cylindrical. The wheel is thus divided into spiral channels, whereof the surfaces are so inclined that when the fluid is admitted they act upon it and work through it without concussion, and carry it by gentle curves to the periphery, where they leave it in a direction as tangential thereto as may be, the vane terminating in a surface which meets the sides of the wheel very obliquely, and in the line of the generators of the vane, that is to say, at a very inclined curve or acute angle to the sides. The wheel is so constructed that an annular opening is left for the exit of the fluid, such opening being formed by the sides of the wheel it, of course, turns with its vanes, so that the water issues at, or nearly at, right angles to the plane of the wheel instead of in the direction of the plane of rotation. This is done thus:—The outlet side is extended and bent, or formed so as to extend beyond the vanes, and leave between itself and the other side of the wheel an annular or circular opening, parallel or nearly so with the plane of rotation, and the water issues thence. The wheel does not revolve directly in the receiver into which the water is forced, but in a casing in which the wheel turns close to the sides of such casing, but not quite in contact with the same, no packing being required. The pump may have its sides open at the centre, so that air may be withdrawn from one end while the water enters freely at the other. A suction-pump or air-pump may be combined with the centrifugal-pump, and worked by its axis through a worm-wheel or otherwise, with appliances for putting it out of gear at pleasure. It draws the air from the centre of the wheel, and drives it into the force-pipe or elsewhere. An air-pump for extracting or exhausting air may be applied to or combined with centrifugal pumps other than those constructed according to this invention.

3345.—David Allan Graham, of the city and co. of Perth, N.B., engineer, for "*Improvements in the construction of steam and water traps, and in the floats and valves for the same; also to some extent applicable to other fluid-regulating vessels for controlling the flow of the fluids passing through them.*" Provisional protection only obtained. Dated Dec. 20, 1866.

This invention consists mainly in a new or improved form or construction of "trap" or vessel and its parts, or float-valve and fittings, for allowing and regulating the discharge or escape of the condensed steam or other water which collects and gravitates to the lower part of steam-pipes, steam-cylinders, and other similar conduits and vessels, without loss of steam, and at or under whatever regular or varying pressure the steam may be at which is contained in such pipes or vessels, and which new or improved "trap" or vessel, as a whole, is more simple, efficient, and economical in its construction and action than such vessels have been as heretofore constructed. The shell or outer case of the "trap" may be of various shapes, to suit convenience or taste, but it is preferred either to be of a hollow spherical form, cast in two parts and jointed together by turned flanges, and screw bolts at the centre, or to be of a cylindrical form vertically, with a hollow semi-spherical bottom, and an annular flange-joint and disc cover at the top; in either case the vessel, being only slightly larger inside than the hollow spherical copper float for opening and closing the outlet-valve, the seat of which valve is turned cylindrically, and tightly jointed and fitted into a socket formed on the centre of the lower half or sphere of the outer case. Directly over the vertical line of this outlet-valve seat a small annular piston-seat is tightly fitted into a socket formed on the upper half of the spherical outer case, or in the disc cover when so constructed.

The hollow spherical float has a vertical tube passing right through its vertical axis coinciding with the axes of the valve and piston seats and the line of motion of the float in rising and falling to open and shut the valve, the lid or cover of which is attached to the lower part of the float and to the tube passing through it, which projecting part of the tube forms the stem of the valve and works through a hole for the purpose in the bridge of the valve-seat, while the small hollow piston, which is made of the same diameter and area as the outlet orifice of the escape-valve, is attached to the upper part of the float and a portion of the tube projecting through it for the purpose, so as to work truly and steam-tight in its seat and form a counter-balance pressure surface tending to lift or open the valve equivalent to that acting on the surface of the lid or cover of the valve tending to close it, whatever the pressure of the steam may be in the outer shell or vessel, and which presses equally in all directions round the hollow spherical float, while the pressure of the air without, which acts on the lower side or surface of the outlet valve-lid, is counter-balanced by the pressure of the air acting up through the open-ended tube (passing through the float) upon the upper end or area of the piston, by a small space formed above it, where a screw-plug is fitted into the socket from the outside, so as to regulate the height to which the valve shall rise off its seat, in proportion to the quantity of water required to be discharged from the outer case.

3347.—Whitmore Baker, of Downham Market, in the co. of Norfolk, dentist, for "*Improvements in means or apparatus for lighting fires, which improvements are also applicable to warming apartments, and for other heating purposes.*" Provisional protection only obtained. Dated Dec. 20, 1866.

According to one arrangement of this apparatus, a junction is formed with a gas-pipe by means of a piece of flexible gas-tight tubing applied to one end of a hollow tube, which may be similar in form to a common poker, but with the end opposite to that to which the flexible tubing is attached somewhat spade shaped or flattened, or of other shape or form, and perforated with a number of holes for the escape of the gas for ignition. By inserting this end of the poker with the gas escaping therefrom ignited between the coals or other fuel in a fire-grate, the ignition of the fuel will be effected; or an instrument so arranged may be used to give temporary warmth to an apartment, or for general heating purposes. The perforated end of the poker may be formed to screw on, so that the same poker may have several ends, either of which may be used when desired. A tap is employed to regulate the supply, or the supply may be from a separate elastic and portable chamber containing the gas to be consumed; or, in place of gas, oil or spirit, absorbed and conducted by a suitable fibrous substance, may be used.

3349.—Edward Dorsett, of the City of London, for "*Improved arrangements and apparatus for removing or transferring tar or similar materials from one place or receptacle to another.*" Provisional protection refused. Application dated Dec. 20, 1866.

This invention is intended especially for discharging tar from barges direct into receivers or boilers, instead of pumping out the tar by the ordinary pumps, so that it may be conveyed any distance through pipes without having to pass through the working parts of the pumps, as at present is the case. Between the barge or receptacle containing the tar and the receiver, into which it is intended to be transferred, an air-tight vessel is employed, into which the tar is drawn through pipes, and out of which the tar is forced through pipes direct to where it is to be transferred, and in connexion with this air-tight vessel an improved air-pump is employed, so constructed that it will either pump air into or out of the air-tight vessel as required.

3371.—William Clark, of 53, Chancery Lane, in the co. of Middlesex, engineer and patent agent, for "*Improvements in apparatus for*

producing a draught in furnaces, and for purifying the smoke therefrom." Patent dated Dec. 21, 1866.

Many attempts have been made to prevent the dispersion into the atmosphere of the black smoke produced by the combustion of fuel in furnaces, and various combinations of apparatus have been tried and proposed, without, however, answering the purpose entirely, and even if partially successful in some cases, it has been at the expense of the fuel, at the same time increasing the liability to accident.

This invention relates to apparatus for attaining the desired result in a perfect, economical, and available manner. This apparatus intercepts the smoke, which would otherwise pass into the atmosphere in a highly heated state, as near as possible to its point of production, and transforms it into a white vapour, which condenses in the air without disengaging any black particles. The apparatus consists, first, of a reservoir formed of metal, masonry, or otherwise, of an extent in proportion to the amount of smoke to be intercepted and divided into two compartments for the inlet and outlet of the smoke. Secondly, of cylinders provided with water-joints of a circular or other form, each provided with two valves—one for the suction, the other for the discharge; these cylinders are worked alternately by means of a beam, or other means of transmission, driven by a steam-engine or hand power. Thirdly, of a metal or other receiver containing small coke or other separating matters, supported on a grating, into which matters water is injected from above. The smoke, after passing through about 8 inches of water under the grating traverses the coke or other matters containing water as above mentioned, where it becomes separated from the unconsumed parts, and is discharged into the atmosphere from the receiver in the form of a white vapour like steam, at a greater or less height, or it may be condensed by refrigeration, in order to extract any remaining products of combustion, or used for any heating purpose. By reason of the exhausting action of the cylinders mounted on the reservoir which is in communication with the furnace flues, the products of combustion are withdrawn, and a vacuum being created more or less partial, a quantity of air passes down through the grating for maintaining and increasing the combustion—in fact, the exhausting action causes the smoke to pass to and fro above the fire, creating long flames, whereby a portion of the smoke is consumed.

3372.—William Clark, of 53, Chancery Lane, in the co. of Middlesex, engineer and patent agent, for "*Improvements in screw-valves.*" A communication. Patent dated Dec. 21, 1866.

This invention consists in constructing a valve in such a manner that it may be adapted to various purposes, and its main feature is the manner in which it is packed or in the recess which contains the packing. The valve, in all cases, is operated by a screw.

3401.—William Bradburn, of Wednesfield, Wolverhampton, in the co. of Stafford, artificial manure manufacturer, for "*Improvements in treating excrementitious matters and other refuse matters for the purpose of obtaining valuable products therefrom, and in apparatus to be employed for that purpose.*" Patent dated Dec. 28, 1866.

This invention consists in the drying or decomposing in the manner described of excrementitious and other refuse matters, and in collecting the volatile matters driven off, and in applying the products of such drying or decomposition either direct to the manuring and irrigation of land, or to the manufacture of artificial manures. The description of the apparatus employed for the purpose would not be intelligible without the aid of drawings.

3405.—William Clark, of 53, Chancery Lane, in the co. of Middlesex, engineer and patent agent, for "*Improvements in valves.*" A communication. Patent dated Dec. 28, 1866.

This invention consists in the employment of a pair of metal plates or discs, fitted in a box or shell in such manner as to close against seats with their outside faces when the plates or discs are moved forward by means of a wedge introduced between them, which opens and spreads the valve-plates, and presses them against their seats, and they also open and recede from their seats when the plates or discs are moved backward by the same means, thus acting as a double valve, which completely and positively closes a passage way on both sides when in one position, and when in another position leaves the passage way clear of all obstruction, with an undiminished area for the direct inlet and outlet of the full volume of steam, water, or other fluid or gas which may be conveyed to the passage.

3409.—William Henry Cutler, of Eton, in the co. of Bucks, civil engineer, and Thomas Brown, of Grove Villas, Victoria Park, in the co. of Middlesex, civil engineer, for "*Improvements in cocks for stopping and regulating the flow of steam, water, and other fluids.*" Provisional protection only obtained. Dated Dec. 28, 1866.

This invention relates to cocks whose apertures or passages are closed by a valve instead of the ordinary conical plug, and consists, chiefly, in constructing the said valve with a flat surface fitted to bear upon a hollow or cup-shaped seat, or in making the said valve in the form of a cup-shaped seat, or in making the said valve in the form of a cup or basin whose edges fit evenly upon a flat seat or face.

3411.—Henry Bollman Condy, of Battersea, manufacturing chemist, for "*Improvements in the manufacture of chlorine, and in preparations for evolving chlorine for disinfecting and other purposes.*" Provisional protection only obtained. Dated Dec. 28, 1866.

In order readily to prepare chlorine either for the purpose of disinfection or for use in manufacturing operations, a mixture of permanganate of soda, or other soluble permanganate, common salt, or other suitable chloride and sulphuric acid, is employed. It is preferred to prepare a mixture consisting of, say, 1½ lb. of common salt and 1 gallon of permanganate solution of ordinary commercial strength. To this preparation, when it is required for use, commercial sulphuric acid is to be added in the proportion of equal parts. On this mixture being made, chlorine is liberated; the chlorine, however, is not suddenly evolved, but is given off gradually for a considerable time, a circumstance very favourable to its use as a disinfectant.

3424.—Charles Harrison, of the city of Manchester, in the co. of Lancaster, machinist, for "*Improvements in cocks or valves.*" Patent dated Dec. 29, 1866.

This invention relates to cocks or valves for regulating the transmission of fluids, steam, air, and gases, and the object is to obtain a much greater area or passage through the cocks or valves in proportion to their sizes and weights of metal than in cocks or valves of the ordinary construction. The plug of each cock or valve is made hollow, with a transverse bridge or stop in the middle, and forms screws when required at each extreme end of the plug for uniting it to the pipes of supply and discharge. At each side of the bridge two apertures are made opposite each other, and on the plug a barrel is fitted having two opposite chambers, each opening over the bridge with their edges agreeing with the apertures in the plug, and when required the barrel and chambers are in connexion with a disc or handle wheel. The pipes of supply and discharge are always open to the ends of the plug, and when the barrel is in such a position that the chambers are full open to the apertures there is a free passage through the cock or valve; but when the barrel is turned so as to place the openings of the chambers on the plain part of the plug between the apertures, the passage is entirely closed, and all areas of passage between the full open and entirely closed are regulated by turning the barrel and causing the chambers to be more or less open to the apertures in the plug.

APPLICATIONS FOR LETTERS PATENT.

2621.—Alexander Melville Clark, of 53, Chancery Lane, in the co. of Middlesex, for "*Improvements in valve closet apparatus, part of which is applicable for regulating the flow of water in other cases.*" A communication. Sept. 17, 1867.

2629.—Richard Watson, of Liverpool, in the co. of Lancaster, fireproof safe manufacturer, for "*Improvements in apparatus for distributing gas for heating and lighting.*" Sept. 19, 1867.

2643.—Louis Lenzberg, of Oxford Street, in the co. of Middlesex, gas engineer, for "*Improvements in gas-lamps and burners for the same.*" Sept. 20, 1867.

2665.—Angus Mackensie, of Capel Street, Dublin, plumber, and Samuel Robinson, of Brunswick Street, Dublin, foreman builder, for "*Improvements in apparatus to be applied to cisterns for preventing waste of water.*" Sept. 21, 1867.

2668.—Adam Aitchison, of Wilton Terrace, Peckham, gas engineer, and Henry John Grantham, of Dockhead, Bermondsey, both in the co. of Surrey, for "*Improvements in the production of carburetted gas, and in the apparatus and burner applicable thereto.*" Sept. 21, 1867.

2674.—Charles Ritchie, of Brixton, in the co. of Surrey, gentleman, for "*Improvements in apparatus for regulating automatically the supply of gas, air, and water, or any one or more of them, to steam-boilers heated by gas or otherwise, and for utilizing the heat of the gases produced or heated by combustion.*" Sept. 23, 1867.

2677.—William Cooke, of 24, Jermyn Street, St. James's, in the co. of Middlesex, for "*Improvements in apparatus for the regulation of up and down currents of air.*" Sept. 23, 1867.

2686.—Hugh Forbes, of 184, Euston Road, N.W., parish of St. Pancras, in the co. of Middlesex, for "*Improvements in the construction of rotary pumps.*" Sept. 24, 1867.

2688.—George Batcheldor, of Liverpool, in the co. of Lancaster, cement manufacturer, for "*Improvements in trough water-closets.*" Sept. 24, 1867.

2691.—Philip Howard Colomb, of Harrow, in the co. of Middlesex, commander in the Royal Navy, and Francis John Bolton, of Rochester, in the co. of Kent, captain in Her Majesty's army, for "*Improvements in the production of light and heat for signalling and other purposes.*" Sept. 24, 1867.

2692.—Thomas Henry Williams, of 20, Cecil Court, St. Martin's Lane, in the parish of St. Martin, in the co. of Middlesex, for "*The improvement of gas-burners.*" Sept. 24, 1867.

2694.—Charles Denton Abel, of 20, Southampton Buildings, Chancery Lane, in the co. of Middlesex, patent agent, for "*A new or improved method and apparatus for converting the gaseous products of combustion into combustible gases.*" A communication. Sept. 25, 1867.

2698.—James Musgrave, of Belfast, in the co. of Antrim, Ireland, for "*Improvements in fittings for cow-houses, saddle-rooms, and stables, the ventilators of the latter being also suitable for other apartments.*" Sept. 25, 1867.

2700.—George Clayton and William Marbeck, both of Leeds, in the co. of York, for "*Improvements in water-meters.*" Sept. 25, 1867.

2701.—William Woodcock, of Pimlico, in the co. of Middlesex, engineer, for "*Improvements in apparatus or arrangements for warming and ventilating buildings.*" Sept. 25, 1867.

2703.—Alfred Rooker, of East Street, Lamb's Conduit Street, in the co. of Middlesex, engraver, for "*Improvements in taps for beer-casks and other vessels.*" Sept. 25, 1867.

2716.—George Wilkinson, of St. Leonard's Road, Bromley, in the co. of Middlesex, for "*Improvements in pumps.*" Sept. 26, 1867.

2718.—John Brunton, of 37, Kensington Park Gardens, Notting Hill, in the co. of Middlesex, for "*Improvements in machinery for raising water.*" A communication. Sept. 26, 1867.

GRANTS OF PROVISIONAL PROTECTION.

2435.—Walter Christopher Trurgar, of the city of Norwich, surgeon, for "*Improvements in apparatus for regulating the supply of gas to burners.*" Aug. 26, 1867.

2536.—Emile Hubner, of 13, Rue Gaillon, Paris, in the empire of France, engineer, for "*An improved rotary steam or gas engine, also applicable for pumping and measuring liquids.*" Sept. 7, 1867.

2548.—Clinton Edgcumbe Brooman, of the firm of Robertson, Brooman, and Company, of 166, Fleet Street, in the City of London, patent

agents, for "*A new process for producing hydrogen.*" A communication. Sept. 9, 1867.

2564.—James Rae, of Lower Sydenham, in the co. of Kent, engineer, for "*Improvements in portable apparatus for cleansing and filtering water for army and other purposes.*" Sept. 10, 1867.

NOTICES TO PROCEED.

1380.—Charles Ritchie, of Upper Tulse Hill, Brixton, in the co. of Surrey, for "*Improvements in casks, and in apparatus for storing and drawing off liquids and semi-fluid matters.*" May 9, 1867.

1382.—George M'Kenzie, of Glasgow, in the co. of Lanark, N.B., for "*Improvements in the manufacture of illuminating gas.*" May 10, 1867.

1474.—James Theodore Bland and Edwin John Bland, of 15, Broadway, London Fields, Hackney, plumbers, and Thomas Brevetor, of 9, Ash Grove, Hackney, gentleman, for "*An improved apparatus for more effectually regulating the supply of water or other fluids to cisterns or other receptacles, and for economizing the trouble and expense connected therewith.*" May 17, 1867.

1513.—Andrew Barclay, of Kilmarnock, in the co. of Ayr, N.B., for "*Improvements in apparatus for injecting and ejecting liquids and fluids.*" May 21, 1867.

1560.—Henry Bernoulli Barlow, of the city of Manchester, patent agent, for "*Improvements in apparatus for coupling pipes.*" A communication June 27, 1867.

1578.—Henry Cockey and Francis Christopher Cockey, of the firm of Edward Cockey and Sons, of the Iron-Works, Frome, in the co. of Somerset, engineers, for "*Improvements in seal or dip-pipes in connexion with gas and other retorts.*" May 28, 1867.

1860.—William Edward Newton, of 66, Chancery Lane, in the co. of Middlesex, civil engineer, for "*Improvements in filtering apparatus.*" A communication. June 26, 1867.

2125.—William Taylor, of Nursling, in the co. of Northampton, gentleman, for "*Improvements in pipes for ventilating, heating, and vaporizing hothouses, malthouses, and other buildings and residences.*" July 20, 1867.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

2129.—John Shanks, "*Improvements in water-closets.*" Aug. 20, 1864.

2170.—Edward Rigge Lloyd and Samuel Lloyd, "*An improved method of securing tubes in tube-sheets.*" Sept. 5, 1864.

2171.—Edward Rigge Lloyd and Samuel Lloyd, "*An improved method of expanding tubes in tube-sheets.*" Sept. 5, 1864.

2264.—Robert Holt, "*Improvements in the manufacture and construction of hoods for ventilators.*" Sept. 16, 1864.

2310.—Edmund Smith, "*Improvements in wet gas-meters.*" Sept. 20, 1864.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £100 BEFORE THE EXPIRATION OF THE SEVENTH YEAR.

2038.—Antoine Halter and Françoise Decorce, "*Improvements in the manufacture of flexible tubes for the conveyance of water, illuminating gas, or other fluids.*" Aug. 24, 1860.

2210.—Arthur Ransford, "*Improvements in galleries or supports for gas-shades.*" Sept. 13, 1860.

2260.—William Edward Newton, "*Improvements in lanterns.*" Sept. 17, 1860.

2269.—William Edward Newton, "*Improvements in gas-meters.*" Sept. 18, 1860.

Miscellaneous News.

CRYSTAL PALACE DISTRICT GAS COMPANY.

The Ordinary Half-Yearly General Meeting of this Company was held at the Albion Hotel, Aldersgate Street, in the City of London, on Thursday, Sept. 9—Erasmus Wilson, Esq., F.R.S., in the chair.

The Secretary (Mr. Ohren) having read the advertisement convening the meeting, the seal of the company was affixed to the register of shareholders.

The following report and statements of account were then presented:—

The directors regret that they cannot report so satisfactorily as usual to the shareholders. The accident which occurred to the largest (No. 4) gasholder at the beginning of the present half year, from the sudden and extraordinary fall of snow, at the time of the greatest pressure on the manufacturing capabilities of the works, was attended with much inconvenience and loss; and this cause, as well as the diminished value of products, has reduced the amount of profit made. To pay the usual dividend it is, therefore, necessary to appropriate an amount of £400 from the contingent-fund. Nevertheless, the directors have considered themselves warranted, in the interests of the company, in continuing the principle, upon which they have steadily acted for several years past, of a gradual reduction in the price of gas to the consumers, and, conjointly with this diminution of price, of sustaining to the utmost the illuminating power.

The injured gasholder has been repaired, and is now performing its duty satisfactorily, and the opportunity has been taken of strengthening the vessel in such a way as to render a similar accident very improbable.

The progressive increase of the district has called for considerable outlay upon the works in various ways—namely, in the construction of a new retort-house, in providing extra coal storeage, in extending the purifying power, and in the formation of a railway siding for bringing the coals directly into the yard.

The directors have to add to the other sources of increased expenditure, that which has arisen from the necessity of carefully watching the progress in Parliament of the Metropolis Gas Amendment Bill, so as to be prepared, if necessary, to defend the interests of the shareholders.

The balance-sheet for the half year to the 30th of June last, and appended to this report, shows the financial position of the company. The balance of profit and loss for the half year amounts to £4948 2s. 3d., which, with £400 appropriated from contingent-fund, and £72 1s. 1d., the unappropriated profit of the preceding half year, makes the available balance £5320 3s. 4d. Out of this sum the directors recommend the declaration of a dividend at the rate of 6 per cent. per annum on the preference capital; a dividend at the rate of 10 per cent per annum on the original capital; and a dividend at the rate of 7 per cent. per annum on the ordinary 7 per cent. capital, all free of income-tax. The balance of £60 4s. 1d. to be carried forward to the profit of the succeeding half year.

Dr. — *Profit and Loss, Half Year ending June 30, 1867.* — *Cr.*

To Amount for coals carbonized			£8,616 7 2	By Gas-rental	£16,501 11 7	
Lime and oxide			175 12 5	Meter-rental	269 6 11	
Trade charges			751 1 11			£16,770 18 6
Rents, rates, and taxes			591 0 10	Coke made for sale	£2,777 15 5	
Directors and auditors fees			530 0 0	Breeze ditto	269 8 3	
Salaries and collectors commission			944 5 0	Tar ditto	427 8 3	
Wages			2,809 8 9	Sundries	141 11 0	
Interest on loans			606 1 0			3,616 2 11
Bad debts and allowances on collection			194 17 4	Sulphate of ammonia—net profit		129 15 3
Law charges			100 0 0			
Retort account			250 0 0			
			£15,568 14 5			
Balance			4,948 2 3			
			£20,516 16 8			£20,516 16 8

Dr. — *Balance-Sheet, June 30, 1867.* — *Cr.*

To Proprietors for paid-up capital—			By Amount for plant, &c.		£140,245 17 5
3000 preference shares, at £10 per share		£50,000 0 0	Freehold land		8,882 2 11
5000 original shares, at £10 per share		50,000 0 0	Preliminary expenses		3,250 0 0
10,000 ordinary 7 per cent. shares, at £10 per share	£100,000 0 0		Parliamentary ditto		574 7 3
Less amount uncalled	61,299 0 0		Retort account		1,466 5 2
		38,791 0 0	Stock on hand		7,008 11 8
Loans		22,570 0 0	Amount due from sundry persons		4,283 5 0
Amount due to sundry persons		14,224 5 8	Invested in Consols from contingent-fund		164 5 5
Contingent-fund—			Private rental and arrears		6,154 8 5
Uninvested	£1,413 16 2		Public rental and fitting arrears		2,618 12 9
Invested	164 5 5		Balance at bankers		3,535 14 7
		1,578 1 7	Deposit at ditto		4,000 0 0
Profit unappropriated		72 1 1			
Profit and loss		4,948 2 3			
		£182,183 10 7			£182,183 10 7

Appropriation of Balance.

Balance brought forward from last account	£ 72 1 1	Dividend on preference share capital, at 6 per cent.	£1,500 0 0	
Ditto of profit and loss, June 30, 1867	4,948 2 3	Ditto on original share capital, at 10 per cent.	2,500 0 0	
Appropriated from contingent-fund	400 0 0	Ditto on ordinary 7 per cent. capital	1,350 19 3	
				£5,350 19 3
		Balance to be carried to next account		69 4 1
	£5,420 3 4			£5,420 3 4

The Chairman: Gentlemen, our report on this occasion is somewhat less *couleur de rose* than it has been at previous meetings. We have had to tell you of an accident to our largest gasholder from a sudden and great fall of snow—an accident over which none of us could have had any control, and which for the time impeded our operations very much. We have also in our report referred to the diminished value of our products, and I may mention to you that there has been a great increase in the value of the material we employ, and in the cost of labour. When to this is added a considerable sum of money which has been expended in the extension of our plant, I think you will find sufficient to account for the diminution of our profits in the accounts which we lay before you on the present occasion. There is one item of our expenditure which we feel very unkindly in reflecting upon, and that is the amount expended in law, or in other words, the expense of our standing army for the purpose of resisting the aggressions of the great public, who have latterly assumed the position of enemies to our success. But, gentlemen, after telling you this list of our disasters, I may just turn to the other side, and say that the accident to the gasholder has been repaired, and that the gasholder is much better and stronger since the repair than it would have been had the repair not been made. I may mention also that the outlay upon the plant has had the effect of making our works much more convenient, and of adapting them better to the supply of our extensive district. We have now the means of direct communication between the adjoining railway and our works, so that the trucks laden with coal can be run at once into the retort-house and discharged immediately opposite the mouths of the retorts. We have also extensive roofage to protect our coals from damage by rain; in point of fact, we have, by the expenditure referred to, made those preparations which we have reason to hope will in a short time turn to good account, and enable us to speak to you a little more cheerfully than we are able to do on the present occasion. I need not refer to the state of public feeling in reference to gas companies.

You are aware that the public have all at once come to look upon those who conduct gas-works in a most unfavourable light, and to begrudge the shareholders their hard-earned dividends. We have been attacked in all directions, and but for that recommendation of one of our Ministers to "rest and be thankful," I do not know what we should do. The only thing for us is to "rest and be thankful" until the storm has gone by, and not attempt any "great leap in the dark." The stokers in some of the metropolitan gas companies have all at once grown so tender that they cannot undergo that amount of heat to which gentlemen in the use of the Turkish bath submit by way of enjoyment. We learn that it is appointed to men that they should labour and earn their bread by the sweat of their brow; but while professional men and others are content with this lot, our workmen who have strong bones and muscles complain and grumble that they have to toil for twelve hours a day, and want to have their time reduced one-third. I shall not stop to ask how they would employ the extra leisure thus afforded them, but I am afraid they would be at a loss how to fill it up. I have asked our secretary, for another purpose, to supply me with the number of hours a day in which our stokers are engaged. I find that out of the twelve hours, their actual labour lasts only six hours, and that the remaining six they have to themselves. We have a retiring-room for their use, and they can devote their time as they choose. We have heard a great deal about the temperature of the retort-house, and I have been making inquiries to ascertain the precise state of the case. In our works at Bell Green, which are thoroughly well ventilated, and where you will see some fine noble specimens of athletes who would make good models for painters, and who do not know what illness is, I find that at the time when the thermometer in the office was at 65°, the thermometer in the retort-house and during the time the retorts were being drawn ranged from 70° to 105°—*i.e.*, about 5° higher than that of a hot bath, and you know men can bear an atmospheric temperature much higher than a temperature of water. I have sat in a temperature of 240° for ten minutes without deriving any harm from it; so that with regard to the question so far as our works are concerned, the objections, of which so much has been made lately, respecting the intense heat and the great sweatings have no foundation in truth. We supply our men with a certain quantity of oatmeal which is made into gruel, so that they supply the amount of moisture from their skins with exceedingly wholesome food, which puts them into the extremely healthy condition in which they appear. Such is the happy condition of our stokers that the shareholders may feel very confident the dividend we offer them to-day is not a dividend extorted from their blood, or even from their sweat. Although from our ordinary sources of profit we are not able to allot the amount of dividend we have been accustomed to do, yet, being provident men, we have a fund to which we can appeal on this occasion, and make up the deficiency. I trust and expect that the outlay we have made upon the works will be such as to place us in a very different condition in the future. We have kept on in the course which we have always adopted in our district—that of reducing the price of gas from time to time, and of supplying gas of the best illuminating power, it being on an average equal to 14 candles. I have now, gentlemen, to move—"That the report of the directors and balance-sheet, confirmed by the auditors, be received, adopted, and entered upon the minutes."

Mr. LIVESEY: I second the motion, for the purpose of making a remark or two. Although you have offered certain explanations as to the reason why the profits for the last half year are less than usual, I differ with you entirely as to the cause of that diminution. You refer to parliamentary expenses as one cause, but I do not find anything charged in the account under that head. There is merely a charge of £100 for "Law expenses;" but, in the corresponding half year of 1866, the "Law charges" were £53, and you debited the account £214 for "Parliamentary expenses," which you wrote off the capital; therefore, that has not reduced your profit on the present occasion. Then you say the extra expenditure has been necessitated by the gasholder accident. Now, if we look at the "Trade charges" in 1866 and in 1867 (and I presume this expenditure would come under that heading), we shall see that that is not the case. The "Trade charges" for the corresponding period of 1866 were £914, whereas last half year they were only £751, or £163 less; so that the expense upon the gasholder has not lessened your profits. To my mind, the real secret is that you have used too much fuel. You spoke of the "diminished value of products;" I think the proper terms would be "diminished receipts for products," for, if we are to be guided by what we see announced every week as the price of the Crystal Palace Gas Company's coke, I can only say it is always above what I sell my coke for, and yet we have made during the last half year 10 per cent. more than you have done for products. There is a falling off here of 8 per cent. as compared with last year, and, if you had received that 8 per cent., which amounts to £690, you would have had no occasion to appropriate the sum of £400 from the contingent-fund. This account wants looking into, for I do not think the deficiency of profit arises from the deficiency in the value of products. I believe you have had a fair value as compared with other companies, but you have not sold so much. Then, again, under the head of "Lime and oxide," you have charged £175, which is equal to 2 per cent. I should like to know whether that includes labour.

The SECRETARY: Yes.

Mr. LIVESEY: Well, that is 2 per cent. Very few companies pay more than 1½ per cent., and there is no reason why you should pay more.

Mr. H. P. STEPHENSON: There is no labour included in it.

Mr. LIVESEY: Then it is worse still. You are something like 100 per cent. worse than other companies. You can buy oxide the same as they can, and you have the same opportunities for getting lime; therefore there is no excuse for this excess. Then I find that the "Bad debts" have increased over the half year ending at Christmas by 75 per cent., and that, too, with a falling off in the expenditure in coal. You have not expended so much in coal by £440, therefore you have not made so much gas, and yet your bad debts have increased 75 per cent. The next item is the retort account, which is rather an extraordinary one. I find at Christmas, 1865, you charged to retort account £250; at Midsummer, 1866, £300; at Christmas, 1866, £250; and in this account £250. If these items are intended for wear and tear of retorts, it is most extraordinary that the amount should be always about the same. It must be a mere estimate. There are some gentlemen here who know what the wear and tear is, and they will tell you that it cannot be always the same. On the other side of the account in the balance-sheet you have an item of "Retort account, £1466." I should like to know whether that means stock, or whether it is the value of the settings. It has increased quite 100 per cent., because at Midsummer, 1866, it was only £735. Then, with reference to the balance of profit, although the company appear to do as well, or, as I have heard it said, better than any other company in London, I should say that if the capital had been raised on the same principle as that of other companies—*i. e.*, if it had not been exceptionally raised—you would be doing about the worst, for the profit on the last year, from Midsummer, 1866, to Midsummer, 1867, on the whole amount of capital raised is not quite 6 per cent. So that you have the appearance of doing better than any one else, because the first half of your capital pays only 6 per cent. No other company ever raised capital under 10 per cent., except from compulsion; and, therefore, you appear to do better, though in reality you are not doing so well. Then under the head of "Gas-rental," I see you sum it all up in one item; but I think it is desirable you should put down so much as the rental for the Lady Day quarter, and so much for the Midsummer quarter. We should then be able to understand the items in the balance-sheet better, "Private rental and arrears" and "Public rental and fitting arrears." The amount due for rental and arrears appears to be £8773. Of this I estimate about £5500 for the Midsummer quarter; and, if so, the arrears amount to £3773, which is very heavy, and shows a want of exertion on the part of the collectors. With a rental considerably more than double, the company adjoining yours had not, at the same period, one-third of this amount as arrears, the quarterly collection generally amounting to 96 to 98 per cent. on the amount given to collect. Then, turning to the item "Amount due from sundry persons, £4283," I can only suppose that means debtors for products, or sundry matters. The latter must be very small, and the amount owing for products ought not to be anything like this. You have jumped up nearly £3000 in the last twelve months. In my company it is not one-half of this. Then under the head of "Capital," I think you should be more careful. You have raised £40,000 since Christmas, 1865. You have expended in the same time £24,000, and have only increased to the extent of £1300 the coal carbonized. Now, unless that expenditure will carry you over the next four or five years, I think it is most extravagant; instead of £1300 your increase in coals carbonized ought to have been something like £5000 for such an outlay. Then I should like to know how it is you have got such a heavy stock as £7008. With reference to capital, you appear to have raised in shares and loans £161,361, and to have expended £152,951, leaving only £8410 for working capital. Now, according to this account, you require £23,000 for working capital, and cannot do your business properly for less than £20,000. The way you now do it is by working on the debts due to other people—£14,224—and I say you ought to have more capital to work the concern with, unless you can get your arrears in better. The only working capital you have is sunk in the stock, and you have not a penny to cover your debts and gas-rental. According to my calculation, these accounts are gradually falling off. I see that the profit for the half year ending Christmas, 1865, was equal to 4·12; the next half year it was 3·31; the next 3·38; and now it is only 3·0; so that you are gradually falling off, and I have no doubt if I went further back it would be still more apparent. You lose sight of the fact, because you can make 10 per cent. upon £50,000, and only have to pay 6 per cent. on another £50,000, that you are not doing so well as you might do and as you have done hitherto.

Mr. H. P. STEPHENSON: I feel quite sure that we are all very much obliged to Mr. Livesey for the manner in which he has pointed out these things to the directors, but he must not assume that because he has thus pointed them out the directors have not already had their attention turned to them. There are many of the points which he has brought before the meeting which I have no hesitation in saying are perfectly correct, and I can assure the shareholders that they have received our most serious attention and the attention of our engineer and manager; and first I should like to say one word with reference to what fell from our chairman as regards the dissatisfaction existing among the stokers of the metropolis. It is right the shareholders should know that there is no dissatisfaction among the men in our employ. They have always worked in the most satisfactory manner with us and our officers, and I hope they will continue to do so. As regards the parliamentary expenses and the cost of repairing the great gasholder, Mr. Livesey is quite correct in saying that nothing has been charged in the present half year's accounts under these heads; but the way in which the accident to the gasholder affects our profits is this. It occurred at a very important time of the year—I think it was at the end of January—when we were supplying a very large quantity of gas. Our manufactory was consequently disarranged for something like ten days or a fortnight, and we lost, of course, all the gas that was in the holder, which was a large one. We also lost a large amount of rental during the fortnight, and we were put to a considerable expense for extra labour and fuel at that time. All these things operated upon our accounts during the heaviest portion of our lighting, and therefore seriously affected our profits. Then, again, as regards the coke, Mr. Livesey is quite correct; we have not sold so much per ton of coals carbonized as we have previously done. I think the average of our previous half years has been a sale of something like 10½ sacks* of coke per ton of coals carbonized. During the last half year it has been only 8½ sacks per ton: that is a loss of 2 sacks per ton. At the same time I may say this, that when I speak of 10½ sacks per ton, I speak of the time when we were using a coal which produced a very large amount of coke. Mr. Livesey will know the kind I refer to—the "West Wear" coal—which produces a larger amount of coke, and a stronger coke as fuel. I have already mentioned that the item "Lime and oxide" does not include labour, and I quite agree with Mr. Livesey that the £175 is a large amount. As regards our collection, the amount in arrear at Midsummer was about £2000, but we have lately put our collectors on a new system, and they are now collecting 90 or 92 per cent. of their charge. We have also an arrear collector, and the collection is taken out of the hands of the collectors at the end of the quarter and placed in his hands. I believe the only reason why the bad debts have increased this half year is that the general depression existing has extended to our district, and we are suffering in common with other persons. It is no doubt true that the amount of capital spent is large. We have hitherto on many occasions made small extensions, but during the last two years or so our rental has been increasing largely, and while we have lately been reducing the price of gas considerably, we have been making, for us, some rather large extensions. Indeed, at the present time we have, I think, something like £15,000 invested in works which have not been brought into profitable use. Our rental is increasing at the rate of £4000 or £5000 per annum, and we are in such a position that, with the exception of an outlay which may be required for retorts, we shall probably not require any heavy expenditure for the next four or five years. As regards our profit, there is no doubt that it has been declining, partly from the increased cost of coal, and partly, as we have told you in previous reports, from the reduced value of products. Some years ago we were getting £14 per ton for sulphate of ammonia, now we cannot get more than £10. The price which Mr. Livesey referred to as that at which we are selling coke is our retail price; our wholesale price is much lower.

Mr. LIVESEY: I have only a retail price at my works, and yet I make 10 per cent. more.

Mr. STEPHENSON: You may be able to get rid of all your coke at the retail price, but we are not able to dispose of any large quantity in that way. We have made a large contract for our coke at 6s. or 7s. per chaldron.

* A sack is 3 bushels.

Mr. LIVESEY: That is a very great sacrifice, and is not at all necessary. I have been connected with the manufacture of gas for nearly 50 years, and I have never before heard of coke being sold at 6s.

Mr. STEPHENSON: I only know that if we can get a higher price we shall be very glad to do so. The retort account mentioned in the balance-sheet represents the value of our retorts unset and the value of the retorts set.

Mr. LIVESEY: The large amount due to sundry persons, what does that consist of?

Mr. STEPHENSON: That arises in this way: we have lately changed our system of charging the main account. Formerly, if we took up a 2-inch main and laid down a 4-inch main we charged the latter to capital, but upon considering the question we thought this was an incorrect method of conducting our business. We now charge the 4-inch main to capital, but we debit revenue with a suspense account for the value of the 2-inch main that we took up. We have therefore some mains suspense account which have gradually to be liquidated out of revenue.

Mr. LIVESEY: I am aware I said this, but perhaps it would be better to leave it out. I cannot understand how taking up an old main and putting down a new one can be represented by "Amount due to sundry persons." That ought not to be an asset, and yet you take credit for this sum as an amount due to you.

Mr. LINGING: It must be so; it is an asset, and must so appear in our accounts.

Mr. LIVESEY: It has accumulated from £1100 to £4200 in twelve months.

Mr. LINGING: We could not possibly write off the whole amount in one half year; it would swamp our dividend. To my mind it is a healthy state of things, for, instead of charging it to capital as other companies do, we charge it against wear and tear and revenue.

Mr. LIVESEY: I differ with you as to the practice of other companies. If they take up a small main and put down a large one, they charge the difference only to capital. You do not mean to tell me that you have taken up so many small mains and put down larger ones in the last twelve months, that the difference is between £2000 and £3000?

Mr. LINGING: There is an arrear account for the repair of the gasholder and other things.

Mr. LIVESEY: The repair of the gasholder would be on the other side, and not under the head of "Sundry debtors." That amount would be due to sundry creditors.

Mr. LINGING: It is very difficult for the directors to go through figures in this way at the meeting of the shareholders, but, if you will come down to the works, we will give you every explanation.

Mr. LIVESEY: I have no doubt you will, but I did not expect the directors could give these explanations; the secretary and the engineer are here, and ought to be able to answer them.

The CHAIRMAN: We are all very much obliged to Mr. Livesey for his suggestions, and we shall endeavour to profit by the lessons he gives us. We regret that we have not such long heads as he has for turning coal into gold. We should like to have the district which he supplies, where coke can be got rid of at retail price. Our lot is cast in a neighbourhood where the use of coke is very limited, and where, therefore, it is very difficult to sell it at retail price.

Mr. HADLAND: What is the amount of the quarter's rental to Midsummer?

The SECRETARY: I have not got it stated here separately.

Mr. HADLAND: I thought you collected so closely that you could easily tell.

The SECRETARY: The arrears are about £2000.

Mr. HADLAND: Then the rental for the quarter is about £4000?

The SECRETARY: Yes.

Mr. LIVESEY: Allow me to suggest that for the future you should put the two quarters separately; then we can tell at once what the amount of the arrears is.

Mr. STEPHENSON: It is not usual, but there is no objection to do so.

Mr. GRAFTON: Mr. Livesey has made an objection to the raising of so large an amount of capital at 6 per cent. I think that is one of the wisest steps which have been taken by our directors. If you had issued the second capital at 10 per cent., you would have had 4 per cent. more to pay upon it than you now have. At the same time I think there is a very large amount of capital raised, and that there is a great disproportion between the capital and the income of the company. No doubt that has arisen from the facility you have had in raising the money, and consequently from the temptation to incur large expenditure to meet the growing wants of your district. But then I know, from my experience during the last twenty or thirty years, that the demand for gas doubles every ten years, and that you will have to raise still further capital to make future extensions of works. I was glad to hear Mr. Stephenson say that you are still in advance, and that a comparatively small outlay will enable you to meet the wants of your customers. I was very sorry to hear of the accident to the gasholder, and the expense which the company were thereby necessarily put to; but then, as you have added a railway siding which brings the coals into the retort-house, the loss on the gasholder is more than compensated.

The motion for the adoption of the report was put and carried.

Mr. GRAFTON: I have now to move—"That a dividend at the rate of 6 per cent. per annum on the preference capital, a dividend at the rate of 10 per cent. per annum on the original capital, and a dividend at the rate of 7 per cent. per annum on the ordinary 7 per cent. capital, all free of income-tax, be now declared and made payable forthwith."

Mr. HADLAND: I second the motion, and with reference to the last remarks made by Mr. Livesey, I expect the item represents debts due to the company, and that it is not in any way a part of the suspense account. If it is so made up, I think in future reports it should be separated, and that it should be directly stated whether it is a debt due to us or a suspense account.

The motion was put and carried.

Mr. HYDE moved—"That the thanks of this meeting be given to the directors for their able management of the affairs of the company for the past half year."

Mr. GRAFTON seconded the motion, which was carried unanimously, and acknowledged by the chairman.

Mr. HEWES moved—"That the thanks of this meeting be given to the auditors and officers of this company for the efficient discharge of their duties."

Mr. A. WILLIAMS seconded the motion, which was carried unanimously.

Mr. GRAY, one of the auditors, acknowledged the vote.

On the motion of the Rev. G. POCOCK, a cordial vote of thanks was presented to the chairman, and the proceedings terminated.

COUNTY AND GENERAL GAS CONSUMERS COMPANY, LIMITED.

The Twentieth Ordinary General Meeting of this Company was held at the Office, St. Bene't Place, Gracechurch Street, on Thursday, Sept. 26—E. H. J. CRAUFURD, Esq., M.P., in the chair.

The SECRETARY (Mr. R. S. Parker) read the advertisement convening the meeting, after which the following report and statements of account were submitted:—

The directors beg to submit the balance-sheet and accounts for the half year ending June 30, 1867.

After making provision for bad debts, and for all office and working expenses, the revenue account shows a gross profit of £1172 0s. 10d., which, with the unappropriated balance of £46 17s. 2d. from the last account, makes a total of £1218 18s.

Of this sum £897 13s. 6d. has been absorbed by interest on loan capital, and £305 has been applied towards the reduction of the several items of expenditure which fall to be liquidated out of revenue, as shown in the annexed profit and loss account, leaving a balance unappropriated of £16 4s. 6d. to be carried to the current half year.

The directors have also the pleasure of stating that negotiations are being concluded for a lease of the Pater and Pembroke Works, on terms which they believe will prove advantageous to the company.

Dr. *Balance-Sheet, June 30, 1867.* *Cr.*

CAPITAL AND LIABILITIES.				PROPERTY AND ASSETS.			
Capital—				Property held by the company—			
Received from sundry shareholders, viz.:—				Freehold buildings and plant		£31,835 5 8	
£5 per share on 5827 ordinary shares	£29,135 0 0			Leasehold ditto ditto		27,877 18 9	
£5 per share on 2000 preference shares	10,000 0 0			Stock in trade at sundry works		2,763 10 5	
		£39,135 0 0		Office furniture and fittings		90 0 0	
							£62,566 14 10
Debts and liabilities—				Items of expenditure to be liquidated out of revenue by instalments—			
Debentures and loans	£18,591 16 2			Preliminary expenses	£ 900 0 0		
Mortgages on sundry works	8,016 13 4			Parliamentary ditto	250 0 0		
Tradesmen and sundries	1,072 2 2			Chertsey (loss account)	500 0 0		
Acceptances for goods supplied	1,022 2 4					1,650 0 0	
		28,702 14 0		Debts due to the company—			
Profit and loss		16 4 6		Gas and meter rentals	£2,927 2 1		
				Sundries	520 3 3		
						3,447 5 4	
				Cash—			
				Cash at bankers	£ 182 12 3		
				Petty cash—balance in hand	7 6 1		
						189 18 4	
		£67,853 18 6					£67,853 18 6

Dr. *Profit and Loss Account.* *Cr.*

To Coals carbonized	£2,391 14 7			By Balance from June 30, 1866			£ 46 17 2
Lime and purifying materials	74 13 3			Gas-rental	£4,929 9 10		
Wages and labour	863 8 3			Meter-rental	183 2 2		
Rent of sundry works	81 13 4					5,112 12 0	
Local rates and taxes	158 1 1			Coke made for sale	£ 653 8 1		
Agency and collection	78 15 9			Sundry products	22 0 0		
Miscellaneous and petty charges at works	159 9 0			Tar	102 13 2		
Travelling expenses	42 18 8			Sundries	35 14 3		
Retorts	112 4 6					813 15 6	
Allowances and discounts	17 0 9						
Bad debts	71 0 7						
Wear and tear	66 9 6						
		£4,117 9 5					
Office expenses, including directors and auditors fees, rent of offices, salaries, petty expenses, printing, stationery, and advertising		636 17 3					
Interest account		897 13 6					
Sundries written off the following account—							
Furniture account	£ 5 0 0						
Chertsey loss account	300 0 0						
		305 0 0					
Balance unappropriated		16 4 6					
		£5,973 4 8					£5,973 4 8

The CHAIRMAN, in moving the adoption of the report, said the accounts fully disclosed the state of the company, and he thought upon the whole they would be considered satisfactory.

Mr. CRANKY: Not very satisfactory.

The CHAIRMAN said the honourable proprietor would have an opportunity to state his objections presently. The result of the half year's working of the company was a gross profit of £1172 as against £1146 for the corresponding period of 1866. The increase in the profit had not been so

large as they could wish, but it was accounted for by the cost of coal having been larger, and by the fact that extra expenses had been incurred, which had fallen upon the revenue of the last half year. Under the head of "Office expenses" there was a charge of £50, which was a commission at the rate of 1 per cent. the directors had had to pay for renewing £5000 of debentures. Strictly speaking, the whole of that amount was not chargeable to the last half year. The debentures being for five years, they might have apportioned it over the ten half years, but, inasmuch as there were no means sufficient to allow of the payment of a dividend, they thought it better to write off the whole of this incidental expense at once. There was also a charge which never used to be taken into account in the former mode of carrying on the business—viz., "Wear and tear, £66." The shareholders would admit that, in a properly conducted business, all matters which were renewable, and which really and truly belonged to revenue for the half year, should at once be charged to revenue, and not to capital account. In previous years it had been the custom to carry some of these items to capital. Then there was another item—that of remuneration to the director who had charge of the working of the concern. The matter was mentioned at the last meeting, and met with the general approval of the shareholders. All that had been paid on that account was carried to revenue, although perhaps some persons might think that, inasmuch as a considerable portion of that charge was incurred in carrying out increased works and for laying new mains, it might to a large extent have been carried to capital account. The directors had, however, pursued what they conceived was the safer course, one reason being that the capital of the company was unfortunately swollen to an extraordinary and objectionable amount, and they felt it was desirable, if possible, to reduce it by allowing the revenue to suffer even a little more than on strictly financial principles perhaps some would think it ought to suffer. Taking into account, then, the £50 for renewal of debentures, £66 for wear and tear, and £80 to the director of works, there was a sum of nearly £200 additional charged against revenue for the last half year; so that, although the apparent increase of profit was only about £30, there was in reality a *bonâ fide* increase to a much larger amount, showing that the company were acquiring a sounder basis, and that, so far as capital was concerned, they were creeping into a safe financial position. The gas-rental for the half year had only increased about £70, arising from the circumstance that, at some of the stations—especially at Ware—two or three very large customers had diminished their consumption. At the Ely Railway Station there had been a diminution in the consumption of 40,000 cubic feet in one quarter, although upon the whole the company were doing very well in that town. He might mention incidentally that they had introduced a change in the system of the public lighting at the various stations, which in future accounts would prove beneficial to the company. The public lighting question was one which had always given him considerable anxiety, because he was convinced the company had been supplying the gas for that purpose at a price which was less than the cost to them. He felt that there was no reason why the public lamps should be charged at a less rate than the price to private consumers; on the contrary, there seemed to him to be good reason why they should pay as much, otherwise the company were benefiting the ratepayers at large at the expense of individual consumers. But then they were told that having no Act of Parliament, and being on sufferance in the various towns, they were so much at the mercy of the local boards that, if they ventured to charge more than was charged before the company took possession of the works, they would run the risk of having a refusal when they applied to open the roads. They, therefore, thought it better to let things go on as they were, giving the local authorities, as it were, a kind of bonus in order to secure the position of the company, and save them from difficulties with regard to the supply of private consumers. However, after full consideration of the matter, and having ascertained upon further calculations that they were giving the local authorities for 3s. that which cost the company 3s. 9d., he (the chairman) was deputed to go down to Ely, where the question first arose, and endeavour to obtain a more satisfactory arrangement. He felt certain that, as reasonable men of business, it was only necessary to lay the facts before the members of the local board, and the result justified his conviction. There was a difficulty to contend with in that town because the local rates were enormously high, and if he had asked them to pay more for the public lamps, it would have been asking them to add something to their already overburdened taxation. The scheme which he proposed to them, however, was one which they at once saw to be fair and reasonable. He showed them that by a modification of the hours of lighting in accordance with the habits of the people, they might continue to pay the same as before, while the company would be saved from loss by the supply. The result was that the company had now a contract for three years, by which they were paid at the rate of 5s. per 1000 for the gas to the public lamps instead of 3s. as heretofore. The same course had been taken at Ware, at which place a contract was now being prepared, under which the company would have the same price for the public lamps as that paid by the private consumers. At Lea Bridge, the company had certain lights in the Leyton district which were left to them when their Act of Parliament was obtained, and a portion of their district was handed over to the West Ham Company. Those lamps had previously been charged £3 4s. each per annum, but the moment the West Ham Company went into the place they got £4 4s. for them. The directors of this company, therefore, when the renewing of the contract for the lights left to them in that district came before them this year, intimated to the authorities that they should expect the same terms, and those terms had been agreed to. At Walthamstow, the price had been raised from £3 4s. per lamp to £4 5s.; but that arrangement involved an extension of the lighting from one o'clock in the morning to five o'clock, which was in some respects a convenience to the company. These new arrangements had not hitherto produced the advantages to the company which would be shown in future accounts. With reference to products, it would be seen that the company were in a very good position. During the last half year they had had £653 of coke made for sale, the great bulk of which had been actually sold, so that the figures in the account did not represent a great stock in hand; in fact, at the close of the half year, they had no stock at all, except at one station. The tar account, also, had improved, being this half year represented by £102 13s. 2d., as against £71 5s. 10d for the corresponding period of 1866. The item of coke in December, 1866, was £678, and in June last it was £653, being only £25 less than at the former, which was the most remunerative period. The account for June, 1866, was only £359, as against £653 for the last half year. The cost of coal for the half year ending June, 1866, was £2231; for the corresponding half of this year it was £2391; so that, with an expenditure of only £160 more for coal, they had nearly doubled the quantity of coke for sale, showing, as he submitted, that the management of the concern was not open to adverse criticism. The only other point to which he thought it necessary to direct attention was with regard to the lease of the Pater and Pembroke works. The directors found that those works being at a very great distance from town, they could not manage them with that advantage which they could have done had they been nearer at hand. It was impossible properly to control the collection, which required very active and vigilant attention, the inhabitants consisting mainly of working men of no great means. The company frequently made bad debts, owing, he was afraid, to the neglect of the collector, who had other business of his own to attend to, and whose appointment the directors had recalled. In consequence of the difficulties attending the management of these works at a distance of twelve hours journey from the metropolis, they had been desirous to let them. They had several applications, and amongst them was one from Mr. G. W. Stevenson, who was connected with other works in the locality. Mr. Stevenson was supplied with all the figures which the directors thought it right to submit to him, and he arrived at the same result that others who had examined the matter had done. The consequence was, the company had entered into an agreement with him to lease those works for a period of 21 years, terminable at the expiration of 7 or 14 years, at a rent of £200 per annum. The company were to provide any capital required for outlay, and the lessee to pay 5 per cent. upon it. Mr. Stevenson was to provide at his own cost all meters and services, whether new or renewals of old ones, and to keep them in repair. It was also a part of the contract to carry out a principle which it was believed would improve the condition of the works—viz., that instead of continuing the works at Pembroke, which had been an absolute loss to the company for some time past, the manufacture of gas should be carried on at Pater, and that a main should be laid down from there to connect the two places. Upon that outlay the lessee was to pay 5 per cent. He was to take the price of gas as at present at 5s. 6d.; if he lowered it, it was to be at his own risk; if he increased it to 6s., the company were to receive 3d. out of it. In addition to that, the calculation was taken upon a manufacture of 6 millions, and for all gas made beyond that the company were to be paid at the rate of 3d. per 1000 increased rental for it. It might be questioned whether the rent reserved by the lease was not a low one; but he was prepared to show that when all the expenses were taken into account, and allowance made for wear and tear, depreciation, and renewals, the company were not making more, if so much as £200 a year by those works at present. Therefore they considered that in granting this lease they were getting a fair fixed rental and a fair share of any increase which might take place in the business, while they had the option of resuming the management at the end of seven years. In addition to that they were saved from considerable outlays which must inevitably be made. They had a tank there which was perfectly useless, because it was not water-tight; they were working at a loss, which during the last year amounted to £21; they would have to put up new retorts, and to lay out further sums upon the gasholder, in addition to the expense of connecting the two works; so that in entering into this lease the directors believed they had made a very satisfactory and beneficial arrangement for the company. They would save the necessity of laying out money for coals, and the risk of getting in the gas-rents, while they would receive as much as they now made free from those contingencies. The works would be in the hands of a man of experience and knowledge of the locality, who had in his lease every inducement to improve them and keep them in an efficient state. There was one other condition in the agreement, which was that the lessee should be at entire liberty to get hold of the Government works if he could. At present the dockyard and barracks were supplied from separate works belonging to the Government, and Mr. Stevenson had intimated that it might be worth while to make some sacrifice to get hold of those works. Whatever expenditure was thereby incurred would be entirely his own, but if he did get possession of the works the company were to have the advantage of it whenever the lease terminated, the only stipulation being that if the company broke the lease at 7 or 14 years, any capital he might have laid out in getting the supply from the Government they were to pay for at a fair valuation. If the lease lasted for 21 years, the thing was to come back to them with any outlay he might have made to get the supply. The only other thing he had to report to the meeting was that finding their trade at Lea Bridge increasing very rapidly, they had thought it desirable to secure an additional piece of land from the same landlord and at the same rent, with a power of purchase within the first seven years, at a price named. Although they had to pay a heavy rent—£200 a year—for this 2¼ acres, on a lease of 82 years, they had already got a contract to let off all that they did not absolutely require for £150, the tenant to lay out all the money the company were bound to lay out under the contract with their landlord; so that he believed they would be able eventually to utilize all the land required for their works without any additional expense.

Mr. J. CLARKE seconded the motion.

Mr. WHIFFEN said it seemed to him that they were deprived of a dividend owing to the unfortunate loss at the Chertsey works. He understood originally that that loss was only £1000.

The CHAIRMAN said, on looking back to the accounts, it would be seen that it was originally stated to be £2600. By the sums which had from time to time been written off, it was now reduced to £500.

The Rev. G. POCOCK said he observed that the amount charged for interest had increased during the last half year from £840 11s. 11d. to £897 13s. 6d., and the office expenses from £563 10s. to £636 17s. 8d. It appeared to him, from the former circumstance, that the company were now more indebted than on the last occasion.

The CHAIRMAN said he had already explained the reason of the increased charges under the head of "Office expenses." With regard to the "Interest account," the company were not more indebted; in fact, at Christmas the amount was £36,655, whereas in June last it was £28,702. The amount of debt bearing interest was increased, because they had had to borrow money to meet the heavy liabilities they were under.

Mr. PURVIS thought the item of "Office expenses" required further explanation. Comparing that item for the past half year with the charge under the same head for the corresponding half of 1866 there was an increase of £137 11s. 11d., although the directors fees were reduced £100, and the auditors fees £10.

The CHAIRMAN said he had already stated that under this head was included the £50 paid as commission on the renewal of debentures, and that certain charges hitherto carried to capital were now brought into revenue under that head.

Mr. PURVIS remarked that among the charges under that head were "Fees for consultation with the superintendent of works." He now heard with pleasure that the directors were going to enlarge the works at Lea Bridge, and he hoped the result would be to save half the fees of the managing director and the rent of the city office.

The CHAIRMAN said the directors had anticipated the suggestion with respect to the office, and had arrangements in view for carrying it out if it could be done with advantage; but with regard to the half guinea fees,

he doubted whether they could be at all diminished. The half guinea fee was the ordinary committee fee for attendance, and the arrangement with the director of the works was that he should be paid the same for his interviews and consultations, and where there was any special visit to the works by him a fee of two guineas was allowed. He did not think that any change of office to Lea Bridge would reduce this part of the expenditure.

Mr. PURVIS thought the superintendent might come and take the opinion of the board as a whole without requiring a special consultation with the managing director, and thus save this extra expense.

The CHAIRMAN said he could not agree with Mr. Purvis in this matter. Mr. Southwell was the general superintendent, but sometimes questions of difficulty arose respecting which it was necessary to consult Mr. Kirkham, and it was hardly to be expected that that gentleman would give his advice for nothing.

Mr. PURVIS was at a loss to see how Mr. Kirkham could sever his advice at the board from that of himself as an individual director. When he was elected he was virtually asked to give the company the benefit of his counsels, and it was not expected that he would receive additional fees whenever he was consulted.

The CHAIRMAN said special power was given by the Articles of Association to make such an appointment as that of managing director, and if the board employed a gentleman who was not a director for that purpose, they must pay for his services, and perhaps not have the business so well done. The attendance of Mr. Kirkham on all emergencies involved greater attention than was required by the mere duties of a director.

Mr. PURVIS said they then came back to the consideration whether the superintendent was able to conduct the works. If not, they had not got the right man. He thought the superintendent ought to do his work without continually consulting another engineer. If he had not sufficient latitude given him, the question was whether they ought not to make a change.

The CHAIRMAN said the opinion of the board was that the position of the superintendent was different to that of the consulting engineer. Mr. Southwell's duty was to go down to the various works and take charge of them. The board placed entire confidence in him, and the results were such as entirely to justify his appointment. But they did not think it desirable to confide entirely the management to him, and by the arrangement now made they did the work efficiently at less cost than by the employment of a consulting engineer.

Mr. CRANEY asked whether it was by the managing director's sagacity discovered that the company were supplying gas at 3s. which cost them 3s. 9d. per 1000?

The CHAIRMAN said he had always a conviction that the price charged for the public lamps was inadequate, but it was in consequence of calculations which he requested Mr. Southwell to make that he was able to determine the matter accurately.

Mr. A. WILLIAMS asked what amount of capital had been expended upon the Pater and Pembroke works, and what was the amount of gas-rental there for the last year. He had himself been making a few calculations upon the affairs of the company generally, for the last three years, which he thought were worthy of notice. The result of those calculations proved that the quantity of coals used by them was gradually increasing, while the rental was gradually decreasing. In the year ending June, 1865, for every £1 spent in coals they got a rental of £2·427. In the year ending June, 1866 for every £1 spent in coals the rental was £2·259; and in 1867, for every £1 worth of coals the rental was only £2·138. There was, therefore, a constant going backwards, which he did not think could be accounted for by the increased cost of coal. He might also allude to the item of "wages," though probably that could be explained more easily. The wages between 1865 and 1867 had increased from ·336 to ·361

The CHAIRMAN said that any gentleman connected with gas-works would see that such a comparison with respect to the coal offered no true criterion whatever. It was impossible, without further data to analyze the accounts and prove that there had been an actual falling off. A great deal depended upon the quality of the coal, and they must know also what the tonnage was. In answer to the question of the honourable proprietor, he might state that the capital at the Pembroke and Pater works in 1859 was £4534, but by continual additions up to 1866 it had been raised to £8991. The gas-rental at Pater for the half year ending Christmas, 1866, was £566 2s. 5d.; and at Midsummer, 1867, £543 4s. 6d.; total for the year, £1109 6s. 11d. At Pembroke, for the half year ending Christmas, 1866, the gas-rental was £173 10s. 5d.; and at Midsummer, 1867, it was £141 16s. 6d.; total for the year, £315 6s. 11d.

Mr. H. P. STEPHENSON said if reference were made to the report of the committee it would be found that at the time Mr. Southwell was appointed it was contemplated that the whole management of the company should be in his hands. He (Mr. Stephenson) was then acting as consulting engineer to the company at an arranged fee of ten guineas a year, and he was confident that there was then no idea of having a director of the works, or any other engineer in their service. Having seen a great deal of Mr. Southwell, he was clearly of opinion that that gentleman was thoroughly competent to manage the affairs of the company alone; in fact, he would go further and say that Mr. Southwell was better able to manage the company alone than while having a check upon him, and the so-called assistance which he received. That was all he had to say with reference to that point, but there were two or three other matters to which he desired to call attention, arising out of the accounts. The first was the question of office expenses. In June, 1865, the office expenses for the half year were £497. That was at the time when it was contemplated that the new system of management would create a great economy in the working of the company. And at that time he believed the directors voluntarily offered to reduce their fees from £300 to £200 a year. In June, 1866, there was the slight increase of £2 in these expenses, but in the half year ending June, 1867, the office expenses increased to £637—a total increase of £140. The chairman had stated that this increase arose from including under this head the salary of the director of works. But he would remember that the salary of Mr. Hope and the consulting engineer formerly were always paid out of revenue. The only money paid to the engineer out of capital was the commission on new works; the current expenditure of £100 a year was always met out of revenue, and therefore the chairman's statement did not account for the increase in this item. As to the item of "Interest," it appeared that at June, 1865, they had paid during the previous half year £640; at June, 1866, it was £702; and at June, 1867, it was £898; being an increase in those years of £258 per half year, although the bank rate last year was £10 per cent., and now it was only 2½ per cent. The chairman's explanations therefore failed to carry conviction to his mind. Last year the company were paying 10 or 12 per cent. for temporary loans; this year they were probably paying not more than 5 or 6 per cent. Then he had worked out a comparison of the gas and meter rental with the total expense of working per pound of rental, and he found that in June, 1865, the total working expenses per pound of rental, according to the balance-sheet, were 15s.; in June, 1866, 15s. 6d.; and in June, 1867, 16s. 1d., showing a gradual increase of expenditure, the total increase being 13d. during those periods. He had also worked out the amount of gas and meter rental received for every £1 spent in coal, and he found that at June, 1865, they received £2 8s. 6d.; at June, 1866, £2 5s. 2d., or 3s. 4d. less; and at June, 1867, £2 2s. 9d., or 2s. 5d. less; making a total decrease of rental in 1867 below that of 1865 for every £1 spent in coal of 5s. 9d., showing again a gradual declination in the working of the company. He had also worked out the "Wages" per £1 of rental, and found pretty nearly the same result, so that the "Office expenses" had not been increased by any transfer of management to that head. He had made a further calculation in reference to the products, and found that in June, 1865, the company received 8s. 2d.; in June, 1866, which was the half year depreciated, as the directors stated, by the new arrangement of stock taking, they received only 4s. 1d., and in June, 1867, they received only 6s. 10d.; the difference between 1865 and 1867 being 1s. 4d. for every £1 spent in coal, so that they were lower in gas-rental, the same in wages, and lower in products. He did not attribute this in any way to Mr. Southwell's working, because he knew from experience that Mr. Southwell was working under considerable difficulties, that he had his hands tied in various ways, and that there was no want of energy on his part. He did not think the company could have a better man for superintendent, and so far as he was concerned the company was well managed. With reference to the Pater and Pembroke works, he might say that he knew Mr. G. W. Stevenson well, and entertained for him a high opinion as an engineer and a man of integrity. But he thought the shareholders should exercise great caution before they plunged into the proposed lease, if the figures he was about to give were correct. Of course upon that point they could easily satisfy themselves. He was about to give the meeting the profit of those works from 1862 to 1865, and they would then be able to judge whether it was desirable to lease these works at a rent of £300 a year. To him it appeared to be throwing the works away. For the half year ending June, 1862, the returns from the Pater works were £216; at December, 1862, £300; total for the year, £516. At Pembroke, for the half year ending June, 1862, the returns were £58; at December, 1862, it was £122, making a total for the two stations of £696. In 1863 the returns were £798; in 1864, £609; and in 1865, £438. If these figures were correct he thought it would be suicidal to lease these works for £200 a year.

The CHAIRMAN said these figures did not agree with the books.

Mr. STEPHENSON said he thought it would be very much better to sell the works for whatever they would fetch, and with the money thus obtained to pay off some of their temporary loans, which, in some cases, had been raised at 10 per cent.

The CHAIRMAN said it was quite true there was a sum of £2000 upon which they paid 10 per cent., that being the amount of an overdue debenture which they were only able to prevent being claimed on those terms. If Mr. Stephenson, instead of finding fault with the directors, would assist them to the means of meeting their liabilities, he would be doing the company much more real service. If he could help them to raise the money at 6 per cent., he would receive the hearty thanks of the board. The parties who held the £2000 debenture refused to renew it, but allowed it to lie over.

Mr. STEPHENSON said he had not come with the intention of finding fault, but of pointing out facts. He thought it would be well to sell the Pater and Pembroke works, if they only realized £3000 by them.

The CHAIRMAN said, if they sold those works for £3000, which cost nearly £9000, there would be a sum of money to write off the profit and loss account every year, as in the case of the Chertsey sale; and he was afraid the youngest amongst the shareholders would never live to receive a dividend. If Mr. Stephenson was not satisfied with the course taken by the directors, let him move for a committee of investigation. The books were open to such a committee, and they might institute the strictest scrutiny. With regard to the sale of the works, he held in his hand a letter from Mr. Stephenson himself, asking whether the directors were willing to sell or lease them. To that letter he replied that they would do either, but Mr. Stephenson had taken no steps to effect a sale.

Mr. STEPHENSON said he was commissioned by Mr. Barlow to ascertain the fact. He communicated to Mr. Barlow the reply of the chairman, but he could not make him buy the works.

The CHAIRMAN said it was all very well to talk of selling, but where was the purchaser? The directors offered to sell them to Mr. Stevenson, but he declined, and said he would prefer having a lease. If a *bonâ fide* purchaser could have been found, and the shareholders had expressed an opinion in favour of a sale, even at a loss, the directors would have known how to act. Mr. Stephenson had gone into a calculation to show what was the proportion of profit in 1862 and 1866, at Pembroke, with the view of proving that the affairs of the company were retrograding; but, even supposing he was right in his figures, he had forgotten to tell the meeting that, in 1862, the company were getting 7s. 6d. per 1000 feet for gas, and in 1866 only 5s. 6d.

Mr. STEPHENSON: I think you have reduced the price at Pater in a most reckless manner, and that it will easily bear a rise.

The CHAIRMAN: Mr. Stephenson will recollect that in 1862, 1863, and 1864, he was the engineer of the company, and we acted under his advice.

Mr. STEPHENSON: You lowered the price to 6s. 6d. under my advice, but you lowered it to 5s. 6d. against my advice.

The CHAIRMAN said if they had not done so they would have lost the works at Pater as they did those at Chertsey. It must be remembered that they were not the only makers of gas there, and when they went down it was constantly thrown in their teeth that the Government were making gas at 3s., and realizing what they said was a good interest; so that there was a rod in pickle continually before them. It was a matter of discretion, and perhaps they might have done wrong in lowering the price too much. With regard to the products, it must be borne in mind that the figures now in the accounts represented the actual value in hard cash, and not an estimate of the stock in hand. As to the Pembroke works, the increased consumption of gas had been really nothing since the company had them.

A PROPRIETOR asked what would be the expense of connecting Pembroke and Pater.

The CHAIRMAN said about £800 or £1000, but that was an expense they would have to go to under any circumstances.

A PROPRIETOR asked whether it would not be better to keep the works, and not borrow money at 10 per cent., when they were only to have 5 per cent. upon the outlay.

The CHAIRMAN said the contract was complete, and the works would be taken possession of the following week. But for that the directors must

have laid out money already for stocks of coal and retorts, which would not become remunerative. Mr. Stevenson was to pay ready money for what stock there was in hand. He believed the company would be able out of their income to provide the expenditure which would now be required without borrowing.

A PROPRIETOR asked the present rental of those works?

The CHAIRMAN said the gross rental at Pater for the half year ending December, 1866, was £566, and for the half year ending June, 1867, it was £543 5s. 6d. The profit for the former half year was £145 11s. 6d., and for the latter, £177 13s. 9d.=£323 5s. 3d.; that was after writing off for rolling stock and retorts, £47. At Pembroke, for the half year ending December, 1866, there was a loss of £4 9s. 4d., and for the half year ending June, 1867, a loss of £16 9s. 3d.; total, £20 18s 7d., which, deducted from the £323 12s. 3d., left a balance of profit of £302 13s. 8d. But from that amount ought to be written off depreciation, which, calculated at 6d. per 1000 feet of gas made—the make being in round numbers 7 millions—would be £175; but, as they had already written off £75 for retorts and rolling stock, the amount would be £100, which reduced the £302 to £202, so that the actual rent to be received fairly represented the value of the works to the company.

Mr. CRANEY said he thought a rent of £200 was quite inadequate for works which cost the company £9000, and he believed that by efficient management the value of their property could be much enhanced.

The CHAIRMAN said the directors could not get more for them unless they could raise the price of gas, and for a company at a distance to do so would be to create an agitation that must be prejudicial. If there was any possibility of improving the property, it would be much more readily done by the lessee, who, having works at Tenby, and being very intimately connected with the locality, might also have facilities for buying coal and other things cheaper than the company.

Mr. STEPHENSON said it was not an unusual thing for leased works to pay 40 or 50 per cent. on the rental. Mr. G. W. Stevenson and himself had recently tendered for a lease of the gas-works at Oporto, and Mr. Stevenson was successful in obtaining them. The rental was £9500, and he had to pay £4500 the first two years, £5200 the second two years, £5600 the next two years, and £6700 for the last year. He (Mr. Stephenson) thought it was ridiculous for the Pembroke works to be leased for £200, and that before the directors entered upon any such agreement they ought to have advertised for tenders, when, no doubt, they would have had a higher offer.

A PROPRIETOR expressed a strong opinion that the shareholders ought to have been consulted before such a sacrifice was made.

The CHAIRMAN said the directors had thought it right to bring the subject before the meeting, but the Articles of Association empowered them to make the bargain without consulting the shareholders. They had done so, acting to the best of their judgment for the benefit of the company, the bargain was concluded, and possession of the works would be given next week.

The Rev. G. POCOCK said it came very unpleasantly upon him to be told that the shareholders had nothing to do with the disposal of their own property, and though he was always sorry to set himself up against a body of directors, he felt bound on this occasion to say that he thought they had done wrong in not consulting their constituents.

Mr. CRANEY said it was a mockery to submit the agreement to them, and at the same time to tell them they had no voice in the matter.

The CHAIRMAN denied that the agreement had been submitted to the meeting. It was deemed respectful to mention the matter, but the directors had acted under the powers given them by the Articles of Association, and concluded the bargain.

Mr. PURVIS had no doubt the Articles gave the directors the power under ordinary circumstances to lease the works. But this was an extraordinary case, where a large sacrifice was to be made, and it was therefore, to say the least, only reasonable that the shareholders should be consulted. Probably after this discussion the board would see the propriety of not dealing with any other portion of the shareholders property without consulting them. He thought also it would be well if they were to dispense with the services of the managing director for three months.

The CHAIRMAN said he did not believe the course which the board had pursued at all justified the supposition that they would make "ducks and drakes" of the property of the company, but he thought it would be false economy to dispense with the services of the managing director at the present moment.

After some further conversation on these points,

Mr. STEPHENSON moved to add to the motion for the adoption of the report the following words:—"But the shareholders do not approve of the leasing of the Pater and Pembroke works without further information."

The Rev. G. POCOCK seconded this amendment.

The CHAIRMAN said he could not put the amendment, because no notice had been given of it. He had in his hands the opinion of the company's solicitor, who himself first raised a doubt on the subject, that the board had authority, without consulting the shareholders, to enter into the agreement for a lease of the works.

The Rev. G. POCOCK thought it was a very improper question to ask the solicitor whether they could act without the shareholders in carrying out such a sweeping measure.

Mr. STEPHENSON said if the chairman ruled that the amendment could not be put in the absence of notice, he would move that the report be not approved. He presumed it was competent for him to do that.

The CHAIRMAN said the shareholders could negative the motion for the adoption of the report, which was the same thing. He should not, however, object to the amendment being put, although if carried it would be nugatory as to any rescinding of the agreement entered into. The directors were under a contract which could be enforced, so that there would be no practical result from the amendment.

Mr. STEPHENSON said the practical result would be to express the disapproval of the shareholders, and events must follow upon that as best they could.

The amendment was then put, and carried by a considerable majority.

The CHAIRMAN said he had no other course than to declare that the amendment was carried; but he was bound to say that he thought, in justice to the directors, some notice of the intention to propose it should have been given.

Mr. STEPHENSON said it was impossible to have given notice, because until they came to the meeting, they did not know upon what terms the works were to be leased.

The CHAIRMAN said there was a paragraph in the report stating that an arrangement had been made, and the board had no intimation that any objection was to be offered to it, and then Mr. Stephenson came down with his friends, who were satisfied with his view of the matter, and proposed an amendment.

A PROPRIETOR objected to the remark that Mr. Stephenson had come there with his friends.

The CHAIRMAN said if it was deemed offensive to be called a friend of Mr. Stephenson he would withdraw it.

Mr. STEPHENSON said he had never mentioned the leasing of the works to any one except Mr. Williams.

The CHAIRMAN did not wish in any way to act discourteously, but he must repeat that it was a most inconvenient mode of proceeding, and that the contract entered into was one that could be enforced. However, the directors, being in a minority, had nothing to do but to accept the decision of the meeting.

On the motion of Mr. FOXALL, seconded by Mr. PURVIS, a vote of thanks was given to the chairman and directors.

The CHAIRMAN acknowledged the vote, and moved the thanks of the meeting to Mr. Southwell, the superintendent of the company, for the able manner in which he had conducted their affairs; to the working director, to whom he thought it would be found they were largely indebted for the approaching prosperity of the undertaking; also to the secretary, for his careful attention to the duties of his office.

Mr. FOXALL seconded the motion, which was carried unanimously.

The SECRETARY acknowledged the vote, and the proceedings then terminated.

METROPOLIS GAS SUPPLY.

COURT OF COMMON COUNCIL, GUILDHALL—THURSDAY, SEPT. 19.

At the Meeting of the Court this day—the Right Honourable the LORD MAYOR (Sir Thomas Gabriel, Bart., Ald.) in the chair—the special Gas Committee presented the following report:—

To the Right Honourable the Lord Mayor, Aldermen, and Commons of the City of London in Common Council assembled.

We, whose names are hereunto subscribed of your special Gas Committee—to whom, on the 29th day of November last it was referred to carry into execution our report, recommending that we should be authorized to assist in promoting a bill, of which the Government had previously given notice of introducing to the House of Commons, and which was intended, not only to carry out the recommendations of the select committee of that House on the gas question which sat in the session of 1866, but also to confer on the corporation very nearly, if not all, the powers which your honourable court had empowered your committee to give notice of applying for, by a bill to be introduced in the session of 1867: and to whom, on the 7th of February last, were also referred the Gaslight and Coke Company's bill, and the Imperial Gas Company's bill—do hereby certify that the Remembrancer laid before us a copy of the Imperial Gas Bill, which was examined by your committee, and found to contain a clause which would have empowered that company to lay their mains through the City. The company, however, consented to insert a clause, prepared by the Remembrancer, to prevent any such powers being exercised by them. This bill was rejected by the committee of the House of Commons, as stated in that report.

The Remembrancer laid before us a copy of the Gaslight and Coke Company's Bill, which was examined by your committee, and found to contain a clause to capitalize the sum of £360,000, with a dividend of 7 per cent. in respect of sums alleged to have been derived from revenue and applied to purposes of capital expenditure. This clause was opposed by your committee, and the committee of the House of Commons, before rejecting the bill itself, stated that they should, without hesitation, strike out this clause. This bill, however, was also rejected by the committee.

The Government bill, entitled the Metropolis Gas Bill, having been introduced to the House of Commons, we proceeded to carry out the instructions of your honourable court by assisting the Government to carry the second reading of the bill. The Government were also assisted by the Metropolitan Board of Works and the vestries, district boards, and ratepayers of the metropolis generally. The bill, having been read a second time, was referred to a select committee, presided over by the Right Honourable Edward Cardwell. The Government appeared before the committee by counsel in support of the bill; but it appeared, from the opening speech of the counsel, that the Government were not prepared to submit to the committee, by witnesses or otherwise, any maximum price of gas, or minimum of illuminating power. These, as the committee observed, were really the principal questions in dispute. Your committee and their counsel, in consultation with the Metropolitan Board of Works and their counsel, were of opinion that the only course open to them was practically to become the promoters of the bill, thus, as it were, abandoned by the Government. This course was adopted, and during the prolonged sittings of the committee, extending to no less than 23 days, the case of the consumers of gas in the metropolis was supported conjointly by your committee and the Metropolitan Board of Works. The result of this protracted investigation has been already communicated to every member of your honourable court by a copy of the able report of the committee of the House of Commons, and your committee do not consider it necessary in this report to enter into the various arguments used by the committee of the House of Commons in support of the conclusions at which they arrived. The report has doubtless received the attentive consideration of every member of the court.

The select committee conclude their report as follows:—"It is their decided opinion that, either by the way of regulation or by the way of an independent supply, the consumer is entitled to a far more efficient control than he at present enjoys with respect to the supply of gas to the metropolis. The difficulty with which your committee have had to contend will be found to apply to every general bill which may be introduced without the concurrence of the companies for the regulation of their present monopoly. But it will always be in the power of Parliament to prescribe terms of regulation as each company comes before it to apply for new powers, and the necessity for new powers has usually brought the companies to Parliament at no long intervals of time. Your committee, however, do not think it would be just to the consumer to leave him to the casualties of this mode of remedy, and recommend that if the companies decline to submit to general regulations, such as Parliament may consider reasonable, measures should be taken for the introduction of a new supply in independent hands. It is evident from the nature of the case that the possibility of introducing competition in respect of gas is qualified by circumstances which restrain it within even narrower limits than those which apply to other large incorporated undertakings. The difficulty of finding room for mains and service-pipes in the already crowded line of the streets, the public inconvenience of frequently disturbing the pavement, the objections usually entertained by the inhabitants of populous districts to the introduction of new gas-works, &c.; all are obstacles in addition to those which are connected with the raising of the capital required for so great an undertaking as that of supplying with gas any large portion of the metropolis. It seems to your committee, therefore, that the consumer cannot rely upon the probable introduction of new companies in competition with the powerful organization whose existence has been confirmed by the Act of 1860; and that if the consent of the companies to a proper amendment of that Act cannot be obtained, the proper remedy will be for Parliament to concede to the City of London, the Metropolitan Board of Works, or other local authorities of the respective districts, the power of supplying those districts in the manner in which the corporation of Manchester supplies that city and the surrounding neighbourhood. If it shall be urged on the part of the companies that it would be hard to compel them to compete with a public authority, the sufficient answer, in the judgment of your committee, will be that they have brought the competition upon themselves by rejecting reasonable terms, and that it would be unjust to the consumer that he should continue subject to monopoly, and not be provided with the safeguard of effective regulation. Your committee consider that the main cause of the failure of legislation which has taken place in the present year has been the absence of any bills authorizing the establishment of an independent supply of gas in the hands of the local authorities. They recommend that unless terms satisfactory for the consumer can be arranged with the companies, the Board of Trade should abstain from the introduction of any other measure like the Metropolis Gas Bill, 1867. What terms would, in the judgment of your committee, be satisfactory for the consumer, has already sufficiently appeared in an earlier part of this report. Unless the companies are prepared during the recess to consent to such an arrangement, your committee think that every facility should

be afforded to the local authorities of the metropolis, in the session of 1868, for the introduction of an independent supply."

Your committee therefore recommend that they should have authority to act on the opinion of the committee of the House of Commons, and to take such steps as they may deem necessary effectively to prosecute in the ensuing session a bill to confer on the corporation the power of supplying the City of London with gas.

(Signed) J. F. BONTEMS,
And by 14 other members.

Mr. BONTEMS: My Lord Mayor, I am afraid that honourable members have not very distinctly heard the report, and it will therefore probably be desirable, at the close of my remarks, for me to move that it be printed and circulated among the members of the court. At present my motion will be to agree with the committee in their report, and that it be referred back to them to carry the same into execution. Several persons have expressed to me their regret that we are not yet able to present a final report on this question. I can only say that I fully share in that regret, and I do so for the sake of all parties. I regret it for the sake of my own committee. It is not very pleasant to be placed year after year in the front of an opposition to the interests, or the supposed interests, of one's friends. I do not allude to the observations—the personal observations—which have been made upon us at the meetings of the gas companies. They are not worthy of notice, because the speakers impute to us personal motives for the steps we have taken. They impute to us a desire for gain and for popularity, which I entirely repudiate. I say nothing about those remarks—"To shoot at crows is powder thrown away;" but one does feel for the trouble and anxiety of friends, many of them members of this court, who would much rather that our energies were employed in some other direction. I regret it also for the sake of the public. To say nothing of the property that has been injured, the health that has been impaired, and the lives that have been destroyed, by the noxious quality of the gas that has been supplied, it is only a moderate assertion to say that during the last seven years no less than £2,800,000 has been taken by the companies—I will not say illegally, but unfairly and injudiciously—out of the pockets of the public. Some gentlemen may ask how I make that out. I will tell them. In the first place, the gas companies themselves at the commencement of the agitation took off 6d. per 1000 feet from the price of gas, which, according to their own showing, amounts to £200,000 a year. There was no reason why that 6d. should ever have been put on, because the price of coals and labour and the amount of taxation was higher when it was taken off than when it was put on; therefore I say that during the five years that this additional 6d. was imposed £200,000 a year was taken from the public, making a total sum of £1,000,000. Then, after a careful consideration of the subject by the committee of the House of Commons in the last session, the conclusion arrived at was that the price of gas ought to be 3d. per 1000 cubic feet cheaper than it is, and that it ought to be of 16 candles illuminating power. That 3d. per 1000 amounts, according to the admission of the companies themselves, to another £100,000 a year, and the extra cost of making 16-candle gas, also according to their showing, would be £160,000 a year. There is no reason why gas of that quality and at that price should not have been made during the last seven years; and, therefore, I say, taking all these things together, the amount which the public have been charged too much for their gas during the last seven years is £2,800,000. And I say this is a moderate computation, for it is taking the present illuminating power of the gas at 14 candles, whereas Dr. Letheby himself says it is the same gas which was called 12-candle gas seven years ago, but which has been made to appear of from 1½ to 2 candles higher illuminating power by the use of an improved burner. I regret also that we are not able now to present a final report for the sake of this corporation. The corporation was called upon, in the interests of the public, to spend £7000 last year during the gas inquiry. It has been called upon to spend £5000 more this year; and I think it is unfair that they should be called upon to spend a still further sum of money in order to produce the desired result. It ought not to be necessary; it is not creditable to the representatives of the people of this country that it should be necessary. But I regret it more than all for the sake of the gas companies themselves. When I look at the magnitude of the property in peril by these proceedings; when I consider that there is a capital of £6,000,000; that there is a rental income of £1,600,000 a year, and that there is a net profit derived from the gas supply of the metropolis of £600,000 a year; and when I consider that that capital of £6,000,000 was at one time improved to a market value of £9,000,000, but that the result of these proceedings at the present time has been to reduce that capital by £2,000,000, making it not worth more than £7,000,000. I think there is a sufficient cause of regret that, on the part of the gas companies, means were not taken to meet the demands of the public at the earliest possible period Then look at the money that has been spent in the agitation! The JOURNAL OF GAS LIGHTING says that £100,000 have been lost in parliamentary expenses since the year 1857. Well, we know that this corporation has spent £12,000, and I suppose the Metropolitan Board of Works may have spent £5000, and the delegates from the vestries at different times have spent at the outside about £3000. Probably, if they had had more money at the time when it could have been spent usefully, the best part of what has since been spent might have been saved. But the court will see from these figures that, out of the total of £100,000, the gas companies themselves must have spent £80,000, which money has been charged year after year to the consumers. Now, when the special Gas Committee was first formed, I happened to meet a worthy alderman (Alderman Dakin) —whose absence from this court through ill health we all deeply regret—and he tried to point out to me the injudiciousness of commencing this attack upon the gas companies. He said—"You have not the slightest chance of succeeding; all you will do is to spend a great deal of money yourselves, and to cause the gas companies to spend a great deal more, and the consumers of gas will have to repay their expenses." No doubt that has proved to be true as to the expenses; no doubt up to the present time all the parliamentary costs incurred by the gas companies have been charged upon the consumers. But I do not expect that will ever be allowed again. There has been a change of circumstances since that time, now some two years ago. The companies themselves are now actually considering whether they shall not immolate the directors of nine out of the thirteen companies, in order to preserve those of the other four. Another result of the agitation has been that the companies have been condemned by two parliamentary committees. The first committee condemned them very delicately. They said that the price of gas *ought* to be reduced, and that the illuminating power *ought* to be increased; but they would not let the corporation or any other of the local authorities compete with the companies. The second committee say that the price *must* be reduced, and that the illuminating power *must* be increased; and that, if the companies will not do that, then that the corporation and the local authorities must be allowed to compete with them. Then, look at the impossibility of the gas companies obtaining any further powers under the present system! For two years two of the largest gas companies in the metropolis—the Imperial and the Chartered—have been trying to get further powers, and have had bills before Parliament for the purpose. Last year the opposition was not so strong as it has been this year, and they very nearly pulled their bills through, but not quite. The objections to the bills then were chiefly on the question of sites near Victoria Park and at Fulham. But what has been the case this year? There was not the slightest chance of the bills passing. The objection was not to the proposed sites, but to the price and the quality of the gas supplied. The select committee distinctly refused to allow either bill to pass unless the companies accepted the terms which they thought reasonable in the interests of the consumers. Though the Imperial Company almost begged and prayed that their bill might pass, and stated that if it did not they would be exposed to penalties, because they could not meet the demand upon them for gas, the committee refused to listen to their entreaties unless they would consent to the terms laid down. Have the gas companies failed on account of the inferiority of their counsel? It would be very ungrateful in me to disparage our own counsel, who have worked so hard and obtained such substantial success; but I believe our own counsel would be the first to admit that the gas companies have had the best assistance the bar could afford. And as to agents, when I mention the name of Robert Baxter, I think I have said quite enough to convince you that they have not wanted in that respect. When I have seen that gentleman by the side of counsel making suggestions, I have often thought of the words of Oliver Cromwell to Sir Harry Vane, and been inclined to say, "Oh, Robert Baxter, Robert Baxter, the Lord deliver me from Robert Baxter!" Well, the companies, after the campaign of 1866, asserted that they had mistaken the intentions of the select committee, and that if they had known that the committee would have presented such a report they would have furnished such evidence to rebut the charges made against them as would have prevented such a report being made. They said it was all a mistake of the committee, who had no idea whatever of the sort of evidence the companies were able to produce. This year they have had the opportunity of being heard to their hearts content, and to furnish all the evidence they desired. They did so, and what has been the result? Why, they have got a stronger report against them this year than last. So strong, indeed, was their own evidence in our favour, that Mr. O'Malley, after he had heard it, told me that he could found his case better upon the evidence of the companies themselves than he could upon that of our own witnesses. You have heard read a quotation from the report of the committee, and I have no doubt you have observed that that report is much stronger than the report of last session. But I do not want you to take my opinion, or even to be guided by your own judgment in this matter. The JOURNAL OF GAS LIGHTING, which is the organ of these companies, in its impression of the 3rd of September says, "As a guide to future legislation, the report of Mr. Cardwell's committee is more adverse to the gas companies than the report of the committee on the Metropolitan Gas Inquiry of last year"—so that is admitted by the friends of the gas companies themselves. Now we come to the question—Why has there not been a settlement? Why is it necessary we should take further proceedings? I will endeavour to answer that question. You will remember that when this subject was last before the court we had, upon the advice of the parliamentary committee of 1866, tried to come to an arrangement for the purchase of works with the gas companies which supply the City—that is, we had made an offer in that direction, but we found the terms asked were so high that it was impossible we could agree to them. The consequence was that we gave notice for the reintroduction of our own bill, and we urged upon the Government the necessity of bringing in a bill of a similar nature that should apply to the rest of the metropolis. The Government did as we wished them; they gave notice of a bill, and when we saw their notice, finding it was so comprehensive as to include all the objects we sought to obtain in our own bill, and seeing that the select committee of 1866 had reported against the corporation being allowed to make gas in competition with the companies—seeing also that the Government bill would have the full support of the Government, and also the support of the Metropolitan Board, the vestries, and other local authorities of the metropolis—we recommended the court to drop our own bill and join in support of the Government bill. That was done in opposition to the wishes of a minority of my own committee, and perhaps the remarks made by Mr. Cardwell in his report, as to the absence of any bill promoted by the local authorities, might seem to favour the notion that we did wrong in withdrawing our bill. But my own impression now is as strong as ever that we did perfectly right, for I feel persuaded that if we had gone on with our bill the Government would not have gone on with theirs, and we should have been met with the objection that the parliamentary committee of the previous year had reported against competition by the corporation. We should not, therefore, have obtained the second reading of our bill, and the consequence would have been that there could have been no legislation last session. We had the greatest difficulty as it was in keeping the Government up to the support of their own bill. The opposition of the joint-stock interest in the House of Commons was so strong, and it was so supported by the gas interests of the three kingdoms, that we were perpetually obliged to keep the Government up to the mark to prevent them dropping their bill altogether. At one time, I remember, we had to appeal to the whole metropolis, and we obtained the assistance of influential gentlemen from the various boroughs, and formed a very strong deputation to Sir Stafford Northcote. We obtained, also, within a fortnight, no less than 336 petitions, signed by 27,000 gas consumers. By these means we did keep the Government up to the mark; but in order to conciliate the joint-stock interest in the House of Commons, and to make sure of the passing of the second reading of their bill, the Government consented to leave out the price of the gas and the illuminating power, leaving blanks in the bill for the select committee to fill up as they saw fit. That was a mistake on their part; and they not only did so, but in doing it they made a compact with the gas companies that the principle of a 10 per cent. dividend should not be touched—that is, that the committee should not have power to recommend any legislation that would be inconsistent with the principle of a 10 per cent. dividend. I do not say it was not right that a 10 per cent. dividend should be recognized, but I say it was a mistake of the Government to bind the committee hand and foot in that way. There was one part of the bill about which the corporation and the Metropolitan Board of Works were wrongly charged, and that was as to the filling in of the 7 per cent. dividend. That was not the act of the Metropolitan Board or of the corporation; it was the act of the Government, and it was an unwise thing to do. So far as we are concerned we have no objection to the companies making 10 per cent. if they can do it by proper means. Therefore I say it was wrong to put in a dividend of 7 per cent., and it was wrong to attribute that act either to the corporation or the Metropolitan Board of Works. Now, one remarkable thing occurred, which I must mention. It is a curious fact that before the corporation took up this question nearly all the metropolitan press were on the side of the gas consumers; but ever since the corporation has taken up the matter to fight for the public, the leading metropolitan papers have been on the side of the gas companies. Those who have not been behind the scenes

cannot understand the reason. I have been a little behind the scenes, and know some of the reasons, but I do not suppose I know all. What things I do know, although, perhaps, they may be perfectly fair in parliamentary warfare, I must say I do not think testify much to the independence of the metropolitan press. Mr. Cardwell's committee entered upon the consideration of this question in the most satisfactory way, as I think, to all parties; they manifested a determination to keep honourably to the compact which the Government had come to with the gas companies; they also evidently had a strong sense of the injury done to the gas consumers, when they found upon investigation that since the passing of the Act of 1860 the companies dividends had doubled, and in some instances trebled, while, on the other hand, the price of gas to the consumers had not only not been reduced, but in most cases had been actually increased. They also manifested a strong desire to settle the question this year—a strong desire that neither the companies nor the public should be put to the expense of further agitation; and for all these things I think they are entitled to the acknowledgment of our obligations to them. I have already referred to the terms proposed by them—viz., 16-candle gas at 3s. 9d. per 1000; more complete machinery for testing gas; provisions for auditing the accounts of the companies, and for the recovery of penalties; and there was also a mode prescribed for increasing the price, if it should become necessary, on the part of the companies, or for lowering it, if it should become necessary, on the part of the public. Well, those terms were rejected by the companies—not so much the terms themselves as the clauses in the bill which were provided for carrying them out. The JOURNAL OF GAS LIGHTING makes a mistake in saying that the bill was thrown out at the instigation of the corporation. That was not the case. Of course, the tactics of the corporation were to get as good a bill as they possibly could, and not to assent to the passing of the bill too readily; but we distinctly told the committee of the House of Commons that if they could secure to the public terms which they themselves thought as between the companies on the one hand and the consumers on the other ought to be accepted, we would not stand in the way. Therefore, it was not the fault of the corporation that the bill of last session was dropped, neither was it the fault of the Metropolitan Board of Works, for on that point, as on nearly all others, we were in agreement with the board. Well, now, what was the reason for the rejection of this bill by the companies? The ostensible reason was that they were no longer to have the power to make up back dividends. You may depend upon it we shall never have a gas bill which is satisfactory to the public till that power is abolished, for if that power exists it does not matter how extravagantly a company's proceedings may be conducted, because if they do not make 10 per cent. one year they will be able to make it up out of the next year's profits. I say, therefore, there can be no proper regulation of the price of gas to the public until the right to make up back dividends is taken away. But I believe there was another reason which had great weight with the companies, and that was that the committee distinctly refused to allow either the directors or the auditors to receive any compensation in the event of an amalgamation taking place amongst the companies. The directors thought that they and the auditors should have some compensation for the loss of their fees in the event of such amalgamation, but this the committee very properly objected to, for, as they said, these are all annual appointments, and have no claim to parliamentary recognition. The secretaries and engineers hold permanent appointments, and are entitled to compensation; but the directors and auditors have no such right, and I quite think that the decision of the committee on this point had something to do with the rejection of the bill. Now, that the rejection of that bill was unwise on the part of the companies is not only my opinion, but is the opinion of others. The *Times* of the 14th of August blames the companies for not making the concessions required, and hopes "they will be wise in time, and seek at once their own interest in consulting the interests of the public." The JOURNAL OF GAS LIGHTING of the 6th of August says—"We should, however, for many reasons, have been glad to see the question satisfactorily adjusted this year, more especially as the metropolitan gas companies might fail in another session to obtain the moral support of their provincial brethren, which was of essential service in procuring the rejection of the confiscatory clauses of the original bill as a condition of the second reading. Gas supply is not a popular subject in the House of Commons, and many members who supported the companies in resisting the second reading of the bill might be found among their opponents next session." The *Saturday Review*, which has been more bitter against the corporation and the Metropolitan Board than any of the other journals, in its number for August 31 says—"The companies have, by their singular tactics, prevented legislation for a single year, at the cost of a report which will probably be used for the purpose of confiscating the whole or the greater part of their property." And, in another place, the same paper says—"The representatives of the gas companies have shown themselves the most imbecile of diplomatists." I have only a few more words to say, and I hope I have not been tedious; but my committee have been favoured with the confidence of this court—a confidence for which we are obliged, and which I hope will be continued; but we do not want to have a blind confidence—we want a well-informed and intelligent confidence. We do not want to be told that the Gas Committee are acting by themselves, and that the corporation is not responsible for their acts. I will, in conclusion, give you one or two illustrations of the way in which the gas companies have managed their business. Take the Phœnix Company first. They said they wanted to enlarge their works, and some three or four years ago they raised a capital of £204,000 for that purpose. But those works have not been enlarged, or the enlargement which has been made has not been utilized for the purpose of the public to this day, and yet the gas consumers of that district have been charged 7½ per cent. upon that £204,000 ever since that money was raised, making an addition of £15,000 a year to the expenses of the company. The next instance is that of the Chartered Company. The shareholders of that company, last year, no doubt admiring the conduct of their directors in opposing the bill of the corporation, decided, with much generosity, to present them—in addition to the £2500 to which they were entitled as fees—with a testimonial amounting to £1500. But who do you think they charged that £1500 to? Not to themselves, but to the consumers of gas in their district. Now take the Imperial Company. That company we had always supposed were charging for the public lamps of one parish the same as they were charging for those in another parish; but, when we had the accounts produced before Parliament, we found they were charging them in Marylebone at the rate of 2s. 11½d. per 1000 feet; in Bethnal Green, 3s. 1½d.; in St. Pancras, 3s. 3d.; to the railway companies who have stations in their district, 3s. 3d.; to Islington and other large parishes, 3s. 7d.; to Highgate and some other outlying places, 3s. 11d.; while to the private consumers they were charging 4s. The select committee asked one of the witnesses whether the company could supply the public lamps with greater advantage than they could the private consumers, and the reply was that they could not; so that there was not that motive. It seems to me clear that if they begin at 2s. 11½d. and go up to 4s., the object being to get 10 per cent., some must be paying a great deal too much and others must be paying too little; and that is not what I call right management for a large gas company in the metropolis. There is another little matter which applies to four of the companies, and which another company, thinking they had done a good thing, attempted to imitate this year on a scale which would have eclipsed all the rest. These companies say—and I do not dispute it—that some years ago they spent large sums out of revenue for capital purpose which they might have divided as dividend; that is to say, they ought to have raised capital to pay for new works and improvements, but instead of doing that, they paid for them out of profits. The Imperial Company said that they had thus expended £130,000; the Independent Company said they had gone to the extent of £30,000; the London Company, £30,000; and the Phœnix, £144,000; making a total of £344,000 among these four companies, and in former years they got power to capitalize these sums. The Chartered Company thought this was such a good thing to do that they would have enough of it, and therefore they applied this year to Parliament to capitalize profits so appropriated to the extent of £360,000, which was more than all the other four put together; they wished, in fact, to make the consumers of gas in the present day pay an extra dividend on money which they say they expended many years ago under circumstances which were entirely different from those of the present time. And when asked why they did not apply to Parliament for more capital, instead of spending money out of profits, they said, "We did not wish to do so," no doubt for fear that when they asked for more capital Parliament would tie them down as to price and illuminating power. There is one little example as to the way in which the companies produce their accounts, and I have done. Take their "Management expenses." In looking over the accounts from each of the companies for the year 1866, we get a sum of £39,333 for "Management expenses," which I think ought to mean all the expenses of management, including the salaries of the engineers. I cannot imagine any management of a gas company without an engineer; but when application was made for compensation for the officers who are to lose their employment by the proposed amalgamation, we find this £39,333 swelled to £86,000, and we are told that the salaries of the engineers have been put in the labour account, and not amongst the management expenses of the companies. Now, the question remains, what is to be done? Well, I think, in half a dozen lines of the report of the select committee, you are told what ought to be done:—"If the consent of the companies to a proper amendment of that Act cannot be obtained, the proper remedy will be for Parliament to concede to the City of London, the Metropolitan Board of Works, or other local authorities of the respective districts, the power of supplying those districts in the manner in which the corporation of Manchester supplies that city and the surrounding neighbourhood. What terms would, in the judgment of your committee, be satisfactory for the consumer, has already sufficiently appeared in an earlier part of this report. Unless the companies are prepared during the recess to consent to such an arrangement, your committee think that every facility should be afforded to the local authorities of the metropolis, in the session of 1868, for the introduction of an independent supply." This court has put its hand to the plough, and I am quite sure it will not draw back, especially now that it is on the eve of success. I regret that we should have had so much expense, and that we shall have to be put to still further expense—perhaps to the expense of another £5000—but only look at the stake for which we are contending. I have already told you that the inhabitants of the metropolis in seven years have paid £2,800,000 more than they ought to have done to the gas companies, and therefore I think it is quite worth while to spend another £5000 to have the question settled. I am sorry it is necessary for me to advise you to adopt this report, and to go on further with these proceedings; but I hope one more effort will secure a victory for which you will be entitled to the gratitude of the metropolis at large.

Mr. DRESSER ROGERS: I beg to second the motion. Although I consented last year to the recommendation that we should withdraw our bill from Parliament, I cannot help thinking (while I give credit to those members of the committee who recommended that course, for a desire to serve the corporation) that if we had persevered with that bill before the select committee of the House of Commons, we might now be in possession of the power to supply the City with gas. Never was there a time so favourable to the consumers of gas in London as the last session was and the next session will be. I know that position of things has been obtained by the kindness of this court in standing forward in the interests of those consumers, and I hope and trust they will find you in the future going on in this good cause. No other body in this country or in the metropolis could have opposed the companies as you have done, and I hope you will eventually achieve that success which will entitle you to the gratitude of future generations.

Deputy ELLIOTT: I think it is not according to the usual practice of this court to be asked to adopt a report, and then print it and think about it. It appears to me that the ordinary business-like course would be to print the report and think about it, and then come on some future occasion to adopt it. The course we are now recommended to take is very much like asking a jury to give a verdict of "Guilty" or "Not Guilty," and then telling them to retire and consider the indictment and the evidence. Now, my friend the mover made a very able speech, as he always does; but the abler the speech the more pressing is the need that we should have time to consider it. He has made some extraordinary statements, and I should not like, with all the respect I have for him, to act upon those statements without seeing them confirmed upon something like a closer examination than we are able to give them now, and without hearing what the accused parties have to say, those parties having a most serious and important interest at stake. My friend has said that the loss, almost the plunder, which the public has sustained—(No, no)—I apprehend there is nothing disorderly in the use of the expression—the imposition upon the public by these gas companies amounts to something like £2,000,000 in the last seven years. If that be so, by imposition, extortion, or bad management——

Mr. BONTEMS: I beg to say that I made use of no such terms. I said unfair and injudicious management.

Deputy ELLIOT: Well, if by unfair and injudicious management they have wronged the public to the extent of £2,000,000 during the last seven years—if that be true, I must confess so strong a case has been made out against these companies, that, although I have all my life opposed those wholesale attacks upon property, should the case which my friend has stated be made out, I for one would say, by all means go in and slaughter the gas companies at once. But then, I think, we may as well do it in the cheapest way possible. We hear that £100,000 has been spent in the course of this agitation of which the corporation have had to pay £15,000——

Mr. BONTEMS: I said £12,000.

Deputy ELLIOT: And now we are told we must go to Parliament, in the session of 1868, and spend £5000 more in fighting this battle again. Let me entreat the court to take the cheapest course, and go to the cheapest tribunal. Let the court wait till the Parliament of 1869, and then there will be a House of Commons composed of such materials that you will have no occasion to spend £5000 on this business; because, for the sake of a few hundreds, they

will be quite ready to confiscate the property of all the gas companies in London. But, my Lord Mayor, let this court also consider a little, whether the confiscating Parliament of 1869 will stop with the gas companies—whether they will not go on until they come to deal with the property of the corporation itself. I recommend the court not to adopt the report, but to print it, and to have a little patience, and wait until 1869, when they will be able to get, without any struggle or fighting, all that they want from the gas companies.

The motion to agree with the committee in their report was then put and agreed to, and a subsequent resolution was passed to print the report and circulate the same among the members of the court.

GAS STOKERS OF LONDON.

Another Meeting of Stokers was held at Cambridge Hall, Newman Street, on Wednesday evening, Sept. 25, which was attended by about 200 men. Mr. GEORGE BROOK, a poulterer, of Newgate Market, and an ex-Common Councilman, was called to the chair.

The CHAIRMAN said the meeting had not been called to hear speeches, but to listen to statements of the grievances of the men employed in gas-works, and to see whether any remedy could be devised. He understood that the companies had been memorialized on the subject of reducing the hours of labour from 12 to 8, and he had no doubt the committee appointed at the first meeting of stokers had not been idle. If they had been, they were not worthy the name of a committee, for while a large body of men were suffering to such an extent as it had been shown the stokers in London were, to leave them unprotected and unpetitioned for would be positively a crime. He knew something of the difficulties they had to contend with, and he knew too, despite of the assertions of the companies that their men were well looked after and very comfortable, that their labour was excessive, that they had to remain for protracted periods in the fœtid atmosphere of the works, and that the exhausting nature of their toil disqualified them for those social duties which were incumbent upon them as heads of families, citizens, and subjects. He urged upon the men the importance of unity in their proceedings and the necessity of patience in their endeavours. The old song bade them

"Choose not alone a proper mate,
But proper time to marry;"

therefore he impressed upon them the value of wise counsels, unity, perseverance, and patience. If they possessed these they would assuredly succeed. A familiar toast was—

"Eight hours sleep and eight hours play,
Eight hours work and eight shillings a day."

The stokers of London were now asking for a reduction of their labours from twelve to eight hours, and he believed the time would come when they would not only earn 8s. a day, but would be honestly worth it. They did not, however, as far as he understood it, ask for any increased wages, but only for a relief in the periods of work. He was convinced that, if they succeeded in this effort, they would be enabled to put a larger amount of energy into their labour than they could at present, which would thus be a benefit to their employers. In carrying out the movement, they must stand together like men; be on their guard against committing any rash act; and remember that not by force but by union alone could they achieve their object.

THOMAS HOLDEN (secretary of the Stokers Association) said the committee had solicited the directors to accede to the demands of the men, and the answer was they would grant nothing. He believed the reason of this refusal rested, not solely with the directors of the companies, but with some persons in the background. The directors knew full well that the men were worthy of what they were asking for, but there were those behind the scenes who hindered them from conceding it at once. The men must therefore persevere if they would succeed. Political reform was only obtained from a reluctant Government after a long struggle through several successive sessions of Parliament, and at last it dropped upon them almost as from the clouds. The stokers were now seeking a reform in gas-works. They asked that, instead of having two sets of men, as at present, working for twelve hours each, there should be three sets, working eight hours each; and he thought that every one who carefully looked at the subject would be convinced that this demand was reasonable. If they succeeded in thus getting the time of labour reduced to 60 hours a week, their wages in most instances would not exceed 6½d. per hour, which, considering the nature of their employment, was an amount of remuneration they well deserved. He believed there were thousands of working men in London who would not do the same amount of work for £3 per week.

THOMAS UPSHALL, a journeyman joiner, urged upon the men the duty of continuing the agitation, and said that, although they had no association among themselves, as many trades had, if they were only united and persevering they must succeed in their object, which, considering the dangerous nature of their employment, was perfectly reasonable and proper. He supposed the arguments of the gas companies against their demand would be, that to shorten the hours of labour would require the employment of a large number of men, and consequently an increase of the cost of gas to them. But that was not correct, because any increase in the cost of gas would fall upon the consumers, and he did not think any one would at all object to the small additional charge which this concession would render necessary. The companies, however, were strong in their position; therefore, though the demand of the stokers seemed so reasonable, it must not be assumed they would bring their cause to a successful issue, unless they formed a powerful combination. He did not advise a strike; there was no good in that. Strikes were necessary evils, brought about by the conduct of arbitrary employers, in which the men were the greatest sufferers. But if the men combined and persisted in their demands, he believed the companies, in the end, would give way. The public had a great deal to do with this matter, and when a case like this was put before them, they could not but see that the demand of the men was justifiable, and that all the reports in the newspapers about the care taken of them by their employers were unworthy of belief. He moved—"That this meeting, having heard the statement of the secretary, reporting that the various gas companies refuse to receive a deputation or make any alteration in the hours of labour as is now required, resolves to persevere in the demand for 60 hours a week instead of 90."

D. SMITH (Chartered works) seconded the motion.

JOHN KNIGHT (late of the London works) said he wished the public could see the stokers when at work; they would then be able to judge of the soundness of their complaints. In the works with which he had been connected there was not more than half the present quantity of coal carbonized ten years ago, and yet they had the same number of men. Formerly they had only half the work to do on Sunday that they had had since the large new gasholders were put up; the scoops they used were bigger than they were, and in every way the men were being constantly imposed upon and ground down lower and lower, till they seemed now to have reached the lowest possible depth.

Mr. SODEN, who said he was a large consumer of gas, expressed his hearty sympathy with the movement, and his conviction that the great bulk of the consumers in London would repudiate the idea of being supplied with gas at the cost of the health and lives of the men engaged in its manufacture. The companies were self-condemned by their refusal to receive a deputation on the subject of the grievances complained of, and he therefore hoped the present movement, which he believed was in the right direction, would be persevered in till the object the men had in view was obtained.

The motion was put, and carried unanimously.

A vote of thanks was then given to the chairman, and the proceedings terminated.

CANTERBURY WATER SUPPLY.

A Meeting of the Shareholders in the Canterbury Gas and Water Company was held on the 17th inst., in the Lower Music Hall, for the following purposes:—"To receive, consider, and determine upon the report of the directors, recommending a scheme for a water supply; to authorize the raising of such amount of B share capital for the purposes of the water undertaking as may be found necessary." GEORGE FURLEY, Esq., occupied the chair.

The CHAIRMAN said: As this is a meeting of the shareholders of the gas and water company only, I wish, by way of precaution, to state that if any gentleman is present not connected with the company, he will be requested to retire. I do not say that any such person is present, but it is necessary that I should make the announcement, as we may have to come to a vote in the course of the proceedings. This is the first time that the directors have had the pleasure of meeting the shareholders to discuss a very momentous question—nothing less, in fact, than the plentiful supply of pure and wholesome water to Canterbury. We cannot say much for the past. Our water supply has had a bad character, and I am afraid justly so. As we have received the water from the river, so you have received it into your houses—sometimes clear, sometimes thick. So greatly have we felt the inconvenience of supplying such an article, that when we found that there were parties in the city who were using the water and were not paying for it, we felt that we could not press the matter. Under all these adverse circumstances, our water capital of £7500 has uniformly shown a profit of 5 per cent. Bad as the water has been, and bad as it is, it has always paid its way. I now come to the time when many of those I see before me were arrayed against the old directors on the subject of the gas. It is not worth while to go into that question now. I may merely state that many things then complained of would have been altered before if I had had my way. The result of that movement was an application to Parliament for fresh powers, and we thought we might as well at the same time apply for a power to carry out a new scheme of water supply. We knew that there was a local board with very extensive powers looming in the distance. We were sure that that body would want more water than we could supply, and that, failing to supply it, we should forfeit our water capital of £7500. There was no alternative between this and increasing our works. Consequently we included the water scheme in our application to Parliament. Since then the directors have taken great pains, and have spent much time in anxious discussion upon the subject; and at last, after many months deliberation, we have arrived at a determination which is expressed in the report I am about to read to you. I feel sure that every one connected with the gas company—both directors and shareholders—will now take up the matter with the feeling that, if a new water supply is adopted, we shall be conferring a great boon on the city. I trust, therefore, that the report which I am about to read will gain your cordial consent:—

Your directors beg to report that they have given the question of a proper supply of water to Canterbury their most serious attention.

When the present board met under the powers of their new Act, the company was authorized by that Act to carry out a plan proposed by Mr. S. C. Homersham, C.E., to sink a well in a field in Wincheap belonging to Mr. George Gipps, and in the occupation of Messrs. Ash and Sons, and by steam power to pump the water into a reservoir to be made on a piece of ground at St. Thomas's Hill belonging to Mrs. Cronsdill, thence distributing the water through the streets of Canterbury as required.

The question which first occupied the attention of your board was whether the company should carry out the water scheme, or whether the local board would purchase the company's property and plant, and take the supply of water under its control. An offer to sell was, after much correspondence, made by your directors to the local board, and declined by them.

Shortly afterwards a proposal was made to the directors by Mr. Pilbrow, C.E., for giving Canterbury a water supply, which is known as the "Silver Hole scheme." This plan was to draw the water from the Silver Hole and its vicinity, and convey it by means of earthen pipes to the Abbott's Mill, whence it was to be pumped by the water power of the mill to St. Thomas's Hill, and distributed over the city. This scheme had the apparent merit of the cheapness of water power as compared with steam power, but your directors did not feel themselves competent to decide the question of preference, and therefore referred the matter to Mr. T. Hawksley, C.E. Mr. Hawksley came to Canterbury and met the board. After some delay he sent his report, which, after weighing the merits of the two plans as carefully as he could from the data given him, he concludes thus:—

"Lastly, in my endeavour to balance the advantages and disadvantages of the two forms of undertaking, as presented to me, I find myself in this peculiar and unavoidable difficulty, that the *one form* (Mr. Homersham's) *has been legalized, and is fully known in all its incidents, whilst the other* (Mr. Pilbrow's) *has not been legalized, and depends for its value upon much that is obscure, and which it may hereafter become, or be shown to be impossible of realization.* I am, therefore, driven to advise on speculation, and consequently may neither satisfy the board nor my own mind in the opinions I am about to offer. Mr. Homersham's scheme is, in my judgment, satisfactory in all its engineering features, and although in some respects comparatively costly, is not unduly expensive, and would afford a fair and secure, though moderate remuneration to the undertakers. It has, therefore, in all these respects my cordial approval. Mr. Pilbrow's scheme is also in my judgment satisfactory in its engineering features, but with respect to its costs, rests upon data which need confirmation, and which from their nature I am at present unable to analyze. Supposing all that is asserted and anticipated of it be justified by the investigations which the legal advisers of the board must institute, then Mr. Pilbrow's scheme would undeniably be more remunerative to the shareholders than Mr. Homersham's, but nevertheless could not be made available without the aid of Parliament.

"I therefore come to *the final conclusion that if it be felt to be necessary or even prudent to afford a speedy supply of water to the city, Mr. Homersham's project is the only one that can be proceeded with; but that if no such necessity or motive exist, and if on due investigation by the solicitors of the board, Mr. Pilbrow's plan be found to be practicable, the company may with some pecuniary advantage to themselves substitute—but only with the consent of the Legislature—Mr. Pilbrow's scheme for Mr. Homersham's.*"

And in a letter accompanying the report he says: "In this case it is, however, impossible to be decisive, because the data are uncertain. My impression, well or ill founded, however, is that Mr. Pilbrow cannot accomplish what he believes he will be able to effect. It seems to me unlikely that the mill and water rights can be obtained on the suggested terms, and it is more than probable that the abstraction of the spring will be opposed by persons possessing riparian rights. If this do not happen, Canterbury is a place very different from all the rest of the world."

Your directors experienced, with Mr. Hawksley, the difficulty in grappling with the many objections that presented themselves in Mr. Pilbrow's scheme, and were not disposed to recommend it for adoption; but as Mr. Pilbrow spoke so strongly in favour of his scheme, your directors made him a conditional offer to sell their plant, works, and water rights to him for the sum of £5000, subject to the approval of the company, he forming a company to carry out the works. Mr. Pilbrow found there were legal difficulties in accomplishing this object, and the offer was declined. Mr. Pilbrow then announced his last scheme—to sink a well or wells in the Miller's Field, belonging to Mr. Cannon, and obtain sufficient water to supply 500,000 gallons of water daily; to draw the water into Abbott's Mill, and thence by water power pump it into the reservoir at St. Thomas's Hill. These works were to be completed at a cost, as ultimately settled, of £19,000 (including the purchase of the Abbott's Mill, the ground in the Miller's Field sufficient for the well, and the land for the reservoir at St. Thomas's Hill, and certain extensions of works required by Mr. Bateman in his report); and, in addition, Mr. Pilbrow was to be paid for his scheme £2500 in cash, and £2500 in paid-up shares of the company. Your directors deem it only right to mention that Mr. Pilbrow stated the whole amount claimed by him for remuneration would not go into his own pocket, as the works and purchases could not be completed for the £17,500.

Your directors then placed Mr. Homersham's and Mr. Pilbrow's plans before Mr. Bateman, C.E., who came to Canterbury and met your board. Mr. Bateman in his report, after setting forth the main features of each plan, thus concludes:—

"I must therefore report that, in my opinion, Mr. Pilbrow's is the cheapest scheme. It will give an equal amount of equally good water, and possesses other advantages which do not attach to Mr. Homersham's—as, for instance, the large and valuable mill, and a considerable amount of surplus water power for a large portion of the year, both of which may be converted to various useful purposes. If Mr. Pilbrow's proposal, however, be adopted, very clear stipulations should be entered into as to what he undertakes to do, and what his position is as engineer or contractor. It appears to me that he places himself in the position of a contractor, and that it will be necessary that the work which he undertakes to perform should be inspected and certified by a third party."

Your directors were prepared, upon Mr. Bateman's opinion, to recommend Mr. Pilbrow's last scheme for your adoption, but a grave question having arisen whether they could legally do so, they instructed their solicitors to take counsel's opinion on the question.

Mr. Mundell, Q.C., advised, first, that the directors could not legally purchase by agreement the Abbott's Mill and the land for the site of the well. That the company would be bound to execute the specified works [in their Act and deposited plans], and that if the Abbott's Mill scheme was the better an amending Act must be applied for.

Your directors, therefore, under all circumstances, beg to recommend the parliamentary plan as proposed by Mr. Homersham for adoption by the company.

Their reasons for doing so are—

1. The necessity of acting promptly, and carrying out a plan for the supply of good water to the city at once, instead of waiting twelve months before a new Act could be obtained.

2. That Mr. Homersham's is a good and carefully considered scheme. This is attested by Mr. Hawksley, who states, sec. 9, "that no reasonable apprehension can be entertained that the comparatively small quantity of 500,000 gallons per 24 hours will not be obtained;" "that his estimate of the cost of construction is satisfactory" (sec. 11); and "that his scheme is satisfactory in all its engineering features" (page 12).

And Mr. Bateman says: "The scheme is well laid out, the works are very simple, and I have no doubt that an abundant supply of good water might be obtained."

3. That less capital would be required in the first instance for Mr. Homersham's plan than Mr. Pilbrow's, as the works could be constructed to supply the present wants of the inhabitants, and may be gradually increased hereafter as the demand for water increases. Your directors do not consider it necessary (especially after Mr. Hawksley's opinion) to adopt the softening process recommended by Mr. Homersham, but there will be sufficient ground purchased at Wincheap for the purpose in case it should be hereafter considered advisable.

In conclusion, your directors strongly recommend that both the gas and water schemes should not be separated; they feel that "union is strength," and the prosperity of both will be increased, and the expenses of management considerably reduced, by their consolidation.

That is the report of your directors, and I may add that it has been arrived at without one dissentient voice; and in submitting it to you the directors feel that they are offering the best scheme in their power, and one that has met with the approval of two of the most eminent engineers of the day. As regards the cost of the undertaking, I and Mr. Kingsford have made a calculation to the effect that £17,000 would be amply sufficient capital to start the works and to supply the present needs of the city. As the demand increases so our works can be increased; and, as you are all business men, you would have, I am sure, no objection to increase the capital of a concern where an increase return could be shown. And this is one of the advantages of Mr. Homersham's scheme over that of Mr. Pilbrow. The latter plan must be carried out at once in its entirety; while by Mr. Homersham's scheme we can increase our works from time to time as required. And now, in fairness, I wish to call your attention to the last paragraph of the report. As you are aware, our capital as a gas and water company is divided into a certain amount of A and B shares, and these shares, by the Act of Parliament, are to be kept together, unless specially ordered to be separated by the meeting convened for the purpose of creating the B shares. I think it would be a great injustice to the old shareholders if this meeting were to pass a resolution to divide the capital of the water company from the gas company. I think the two undertakings should be worked together, and by the same company. If, however, the meeting does determine to separate the two companies, the plant and works of the present water-works would be valued, and the amount paid over to the gas company by the proprietors of the new water company. And if the loss between the amount of valuation and the water capital—viz., £7500—went to reduce the capital of the gas company, as a whole, it would be perfectly fair; but when our bill was before the House of Lords, Lord Redesdale inserted a most extraordinary and unjust clause, which we were obliged either to accept or to see our bill thrown out. The clause, which was adopted, made it compulsory that any loss upon the sale of our water-works to a new company should fall upon the proprietors of the old water shares only. This would be a simple act of spoliation, for the old gas proprietors benefited as much by the water as by the gas. The profits of both helped to make their dividends; and yet the loss was by this clause made to fall only upon the proprietors of the old water shares. Take a case. Suppose a person were to obtain at a sale by auction or otherwise four £25 water shares, and one £50 gas share. By this clause he would lose perhaps two-thirds of his capital in the water shares, but nothing on the gas share. And as the capital of the two concerns has never yet in reality been divided, you can easily see what an act of spoliation would be inflicted upon those who, perhaps by mere accident, had got water shares instead of gas shares. So strongly do I feel this that, supposing for a moment you were resolved to sever the A and B shares, I should deem it my duty to adjourn the meeting, and take a poll upon the point; and there is very little doubt what would be the result of such a poll—not only amongst the old shareholders, representing £22,500 capital—but also amongst many of the new A shareholders. I tell you all this now that it may not afterwards be said that you were taken unawares, and did not rightly understand what you were called upon to do this evening. You must either make up your minds to sink £7000, and give up the water supply, or you must adopt the report of your directors. There can be no doubt that Mr. Homersham's scheme will give us a good supply of pure water, and also that it will pay the shareholders a reasonable and lasting dividend. I have only this afternoon received a letter from Mr. Hawksley, from which, if you will allow me, I will read a couple of extracts:—

I could not fail to perceive that many engineering questions of importance turned upon the details of Mr. Pilbrow's arrangements. Thus it has, since the delivery of my report, come to my knowledge that by Act of Parliament the Abbott's Mill is precluded from working at certain times from Saturday night to Monday morning; and, again, that Mr. Cannon is unable to give the priority of the stream to Abbott's Mill in dry weather, but, on the contrary, he can only give a title to *half* the stream, although he is the owner of both the mills.

I think you have fortunately escaped a serious difficulty of another kind. The scheme laid before me related to the Silver Hole spring. I considered the situation and quality of that source unexceptionable; but if it had been suggested to me that water should be taken at or near the Abbott's Mill, I should certainly have reported that the public would entertain a prejudice against that situation because of the many drains, cesspools, and sewers, which percolate into the chalk and gravel at and towards the lower end of the city; and that such prejudice would militate seriously against the company's interests.

Let me now finally state my decided conviction that the Legislature has placed the company in possession of an exceedingly good scheme, and that if this scheme be carried out in its integrity and at the smallest cost consistent with sound construction, it will be certain to become a favourite investment for local capital.

I will now simply move the adoption of the report, and leave you to make such observations as you may think fit.

Mr. MARTEN had much pleasure in seconding the motion. After the able and lucid explanation given by their chairman, he did not think it was necessary to make any remark in doing so.

The Rev. Mr. ROUCH said he had one remark to make in favour of the resolution—viz, that the locality in which Mr. Homersham's works are to be erected is a more desirable spot than in the central part of the city (Abbott's Mill). The citizens were already troubled with a great many chimneys in different parts of the town, but under Mr. Homersham's plan there would be no addition to the smoke nuisance.

Mr. ARGRAVE, as an old shareholder, inquired what interest the old shareholders, supposing they did not take any shares in the water company, would have in the new company.

The CHAIRMAN said they would all share and share alike. The profit of the water and the gas would not be kept distinct as before, but would be shared amongst the whole of the shareholders, both A and B, and the stockholders. In answer to a question as to what demand there was likely to be for the water, the chairman replied that they had been served with a notice from the local board requiring them to supply 50 gallons per head per day for 20,000 people. If anything like this amount was actually taken by the local board he could promise then a good dividend.

Mr. DAVEY: Is that an official application for us to supply the water?

The CHAIRMAN: Certainly; it is an application for us to supply the water. There is no doubt that the local board will require a large quantity of water for drainage purposes. There are certain districts where the local board have power to enforce the landlords of cottages to have a pure supply of water.

Mr. RAYNER: Can any person be compelled to take water whether it is necessary or not?

The CHAIRMAN: Only where it is necessary. As I said before, the local board have power to enforce it in certain parts.

In answer to a question from Mr. ARGRAVE, the CHAIRMAN stated that the working expenses would be about £900 per annum.

Mr. DAVEY thought the question they were called upon to decide was really the merits of two rival schemes. He thought the meeting should be in possession of certain information from the local board. The drainage works were to be carried out under the supervision of Mr. Pilbrow; and he (Mr. Davey) understood that there was a general feeling that the water-works would be carried out under his direction also. Would the local board do the same for Mr. Homersham's scheme as they would if any other person had been appointed?

Mr. PILCHER was of opinion that their difficulties had been much increased by the observations that had fallen from Mr. Davey. Some time ago an application was made to the gas and water company to supply a pure and wholesome quantity of water to the citizens of Canterbury, without mentioning under whose superintendence the water was to be supplied. There was no inclination on the part of the local board to favour any particular scheme. All they wanted was a supply of water, and they had put their demand at the highest amount that they were likely to require. It did not necessarily follow that they would take that amount. It must not for one moment be supposed that they preferred Mr. Pilbrow's or any other scheme. All they wanted was a good supply of water.

The CHAIRMAN read a letter from the town-clerk, the gist of which was that the local board imperatively called on the gas company for a good water supply, and offered to give them all the assistance in their power in carrying out a scheme.

Mr. RAYNER was very pleased to find that the directors had acted as they had. It would, he thought, be unjust to separate the two companies. If the water company were connected with the gas, he for one should be happy to take a certain number of shares. If, on the other hand, they were divided, it would, he thought, be unfair to the old shareholders. The directors were quite right in adopting Mr. Homersham's report; and whatever Mr. Pilbrow might bring before them at a future time, he hoped they would pay no attention to. If they had adopted Mr. Pilbrow's scheme, they would have had no better water than they were now using, and perhaps would be called upon to filter it. In conclusion, he hoped Mr. Pilbrow would be more successful in his drainage scheme than he had been in his water schemes.

Mr. COOLEY, a member of the local board, believed that several persons present were under the impression that that body had the power to compel all householders to take water. He would, however, assure them that such was not the case.

The CHAIRMAN then put the resolution, as follows, and it was carried unanimously:—"That the report of the directors, recommending the adoption of Mr. Homersham's plan, as sanctioned by Parliament, with such modifications as the directors may from time to time find necessary, be adopted."

Mr. HIGHAM proposed, and Mr. ARGRAVE seconded—"That, for the purpose of carrying out such plan, a sum not exceeding £17,000 be raised by the creation of B shares, under the Act of Parliament." Carried unanimously.

The Rev. F. ROUCH proposed, and Mr. MUDFORD seconded—"That a prospectus be issued, setting forth in detail the proposed plan, and that the offer of the B shares be made to the existing shareholders prior to inviting subscriptions from the public." Carried unanimously.

A vote of thanks to the chair having been duly carried and acknowledged, the meeting separated, after having subscribed in the room £4000 towards the proposed capital.

ON WATER ANALYSIS.

At the Meeting of the Chemical Society, held on Thursday, June 20—Dr. WARREN DE LA RUE, F.R.S., president, in the chair,

Professor J. A. WANKLYN read a paper on "Water Analysis; Determination of the Nitrogenous Matter," of which Messrs. E. T. Chapman, Miles H. Smith, and himself were joint authors.

Referring to the present unsatisfactory state of our knowledge respecting the decompositions and mode of detection of organic matters (and particularly those of animal origin) occurring in potable waters, the authors quote experiments which tend to prove that, by the evaporation test, the quality of an identical (bad) sample of water may appear widely different according to the rate of evaporation and the manner of applying the necessary heat in the process of analysis; and, further, when a sample of water containing urea or other sewage products is diluted with a known proportion of distilled water, the indication of impurity is not diminished in the ratio anticipated. Extracts from the *Report* on Metropolitan Waters by Drs. Hofmann and Blyth, 1865, and from the Discourse on Potable Waters delivered last year by Dr. W. A. Miller, were read as authoritative admissions of this and similar practical difficulties. The authors further state that no reliance can be placed on Pugh's method of estimating nitric acid as ordinarily performed, and that ammonia cannot be determined in waters containing nitrogenous organic matters by any process involving the boiling with an alkali.

Direct experiments were made upon known quantities of urea, albumen, and gelatin dissolved in water, and the singular fact was disclosed that, whilst the first of these bodies is completely changed into ammonia by boiling with *carbonate of soda*, the two latter substances resist decomposition until *caustic soda* (or potash) is introduced, when *one-third* of the nitrogen contained in them is evolved in the form of ammonia. The remaining *two-thirds* of this constituent are finally liberated in the same form upon adding some crystals of the permanganate of potash and continuing the distillation. The authors employ Nessler's test for indicating the proportion of ammonia originally contained as such in the water, as well as that subsequently formed, and they rely upon the before-mentioned ratio as confirmatory of the existence of the nitrogen in this most objectionable albuminoid form. The details of operating are minutely described in the paper, and several examples are given by way of showing the application of the process. Thames water collected at London Bridge on June 18, tide two hours flood, contained—

	Grains per Gallon.
Ammonia (ready formed)	·0980
Urea	·0889
Albuminous matter (equivalent to white of egg)	·8820

Other results are quoted for East London water, New River, Lambeth and Vauxhall, and water taken from the pumps in Berkeley Square and Bishopsgate Street.

The PRESIDENT inquired the reason of its being found necessary to determine the ammonia separately in the distilled products obtained in the second and third stages of the operation. Why not mix these together, and proceed to estimate at once the whole of the nitrogen existing in the organic form?

Professor WANKLYN, in reply, said this course might be adopted, but he considered that a valuable indication towards fixing the nature of the nitrogen was obtained by their separate examination, and this did not in practice occupy a longer time.

Dr. THUDICHUM offered some remarks on the probable applicability of this process to the examination of the "rice-water" evacuations in cases of cholera.

Mr. DUGALD CAMPBELL said that his experiences were not in accordance with the statement just now made by Professor Wanklyn. He found that a solution of gelatine invariably gave off part of the nitrogen in the form of ammonia, even upon distillation with carbonate of soda, and the results in the case of urea were not decisive, since it required an addition of caustic alkali before all the ammonia resulting from its decomposition could be expelled. Permanganate of potash had been tried by the speaker in the examination of abnormal excreta obtained in a diabetic case, but neither this agent alone, nor aided by the addition of the caustic alkali, sufficed to liberate the whole of the nitrogen, even when the heat applied was so great as to cause the destruction of the glass vessel.

Mr. E. T. CHAPMAN remarked that when the amount of albumen or gelatine operated upon was found considerable, it was necessary to fill up the retort once or twice with pure water, otherwise the whole of the ammonia could not be obtained by distillation. This precaution might even be required in the examination of any impure water.

Dr. COOK made a short statement in general confirmation of Mr. Campbell's remarks.

In the section of "Chemical Science" of the British Association, Mr. DUGALD CAMPBELL read, on the 6th inst., "A Note on Messrs. Wanklyn, Chapman, and Smith's Method of Determining Nitrogenous Organic Matters in Water," in which he stated that at the last meeting of the Chemical Society, June 20, Professor J. A. Wanklyn read an extract from a paper by himself, Mr. E. T. Chapman, and Mr. M. H. Smith, "On Water Analysis, and the Determination of Organic Matter in Water," in which they proposed a mode of estimating the amount of nitrogenous matter contained in water, whether it exists as ammonia, or urea, or as albuminous matter.

Having for a number of years worked specially on the estimation of nitrogen in solutions containing ammonia, urea, and albuminous matters, I was much struck with the results which were given by these gentlemen, and at the time when the paper was read I expressed my doubts as to the accuracy of their observations, my own having been so diametrically opposite; still, although nothing was said on the reading of the extract about the actions being different with *moderately strong* and *very dilute* solutions, yet after my remarks something was said by one of the gentlemen (Mr. Chapman) in the discussion about strong solutions requiring different treatment; and remembering that my experiments had all been made upon what might be termed moderately strong solutions, certainly not very dilute solutions, I was silent, as I thought this might possibly account, at least to some extent, for the great differences in our results; still I did not think this could wholly account for them.

Since then, however, I have made a number of experiments with very dilute solutions of both urea and albumen, the results of which in a great measure, if not entirely, confirm my views stated at the time—viz., that urea is not perfectly decomposed by distilling with sodic carbonate as described by these gentlemen, and likewise that I had invariably detected ammonia in the distillate from a solution of albuminous matter when it was distilled under similar circumstances.

As regards the first part of the process, which is the estimation of ammonia in the water, and which is in my opinion a very material one, but which appears to me to have been passed over by these gentlemen as a thing of very little importance, all we are told of it is that "when the quantity of ammonia present in the original water is large it is determined directly, unless the water is too much coloured." In all the experience which I have had in determining the amount of ammonia in water by Nessler's test, working on the usual scale, I have never been able to apply it with any degree of accuracy to the original water, but always had to distil the water with some alkali and test the distillate; and this I know is the general experience; and if urea is so readily broken up in the distillation of water as it is said to be by these gentlemen, I should have thought that some means of distilling the water in order to obtain from it the ammonia, without decomposing the urea, should have been given, and that a process for estimating the ammonia, urea, and albuminous matters in water would scarcely be complete without it.

After the determination of the ammonia, the next operation, we are told, is to introduce a litre of the water "into a retort with two grammes of sodic carbonate, and rapidly distil, the distillate being collected in a flask containing 100 c.c. When this is filled the receiver is changed, and another 100 c.c. distilled off; this is repeated a third time, and it is now found that all the nitrogen present in the original water, in the form of urea, has passed over in the form of ammonia. The ammonia in the distillate is then determined by Nessler's test."

I may state that in Parliament, and generally throughout the kingdom, when reports are made upon the analysis of waters, the results are required to be given in grains, or parts of a grain, in a gallon of the water of 70,000 grains at 60° Fahr., and they are thus much more readily understood by engineers and the public generally, who are interested in these matters, than when otherwise expressed. I have, therefore, in the following experiments thought it best to state that the waters operated upon contained so many parts of a grain of the substance being experimented upon per gallon, and also to use grains in making the solutions in other parts of the experiments; but I have retained the litre and cubic centimètre measures, as I wished to follow explicitly the experiment as it is given above, as to the quantity of water taken for distillation and the amount of each of the distillates, in case anything might be said of my not having done so.

The first experiments were made with a solution of urea equal to the 1-20th part of a grain of urea in a gallon of water, Professor Wanklyn having given this as a quantity by which his process could be tried, and with which he said it would work satisfactorily, as it had been described in their paper. The following are the details and results:—

A litre of water was taken in which was dissolved an amount equal to 0·011 grain of urea containing the elements of 0·0062 grain of ammonia, and introduced into a report capable of holding twice this quantity; 30·87 grains (two grammes) of sodic carbonate were then added, and the distillation was proceeded with rapidly, and the distillate collected exactly as described above. The ammonia which was found only in the two first 100 c.c., and estimated by Nessler's test, gave 0·0026 grains, or about one-third of the ammonia present in the urea taken.

There being no trace of ammonia in the third 100 c.c., I should from the statements of Messrs. Wanklyn, Chapman, and Smith, have concluded that all the urea was decomposed into ammonia, had I not known the quantity of urea which was taken at the outset, and also from my former experiments upon stronger solutions of urea which acted very similarly; but knowing this, a solution of potassic hydrate was introduced into the retort, and the distillation proceeded with exactly as before described; the two first 100 c.c. which were distilled over contained 0·002 grains of ammonia, and the third distillate containing no ammonia; potassic permanganate was added in crystals to the liquid in the retort until it was deeply coloured, and the distillation was again proceeded with as above; the remainder of the ammonia, which was estimated at 0·0015 grain, was in the first and second, but principally in the first 100 c.c., and none in the third. Altogether the ammonia obtained was 0·0061 grain, the calculated quantity being 0·0062 grain.

This experiment was repeated as above described, but with somewhat different results, the distillations with the sodic carbonate giving 0·0021 grain, the potassic hydrate 0·0016 grain, and the potassic permanganate 0·0025 grain, altogether 0·0062 grain of ammonia, which is exactly the quantity of ammonia in the urea taken.

Experiments were next made with a solution of urea equal to 1-40th part of a grain of urea in a gallon of water, and the following are the details and results:—

A litre of water was taken, in which was dissolved a quantity equal to 0·0055 grain of urea, containing the elements of 0·0031 grain of ammonia, and distilled as above with sodic carbonate; in the first two 100 c.c. the ammonia present amounted to 0·001 grain; in the third 100 c.c. there was no ammonia; potassic hydrate gave in the first two 100 c.c. 0·001 grain of ammonia, in the third none, and potassic permanganate gave in the first two 100 c.c., but principally in the first, 0·0011 grain of ammonia; making altogether 0·0031 grain of ammonia, which is the exact quantity of ammonia in the urea taken.

This experiment was repeated exactly as above, but, as in the former case, with slightly different results; sodic carbonate gave 0·001 grain, potassic hydrate gave 0·0001 grain, and potassic permanganate 0·002 grain of ammonia, making altogether 0·0031 grain of ammonia.

Experiments were next made with a solution of urea equal to 1-80th part of a grain of urea in a gallon of water, and the following are the details and results:—

A litre of water was taken, in which was dissolved an amount equal to 0·0025 grain of urea, containing 0·00155 grain of ammonia, and treated in the same manner as in the preceding experiments; with sodic carbonate it gave 0·0013 grain ammonia in the first two 100 c.c., and no ammonia in the third; with potassic hydrate 0·0001 grain in the first two 100 c.c., and none in the third; and with potassic permanganate, gave 0·0001 grain of ammonia; altogether within a fraction of the amount of ammonia in the urea employed.

This experiment was repeated, and the results were as follows:—With sodic carbonate, 0·0008 grain, with potassic hydrate 0·0003 grain, and with potassic permanganate 0·0004 grain; altogether 0·0015 grain of ammonia, and making the same amount of ammonia as the last, but evolved differently.

Experiments were next made with a solution of urea equal to the 100th part of a grain of urea in a gallon of water, and the following are the details and results:—

A litre of water was taken, in which were dissolved 0·0022 grain of urea containing 0·00136 grain of ammonia, and distilled as above; with sodic carbonate in the first two 100 c.c. there were 0·001 grain of ammonia, and no ammonia in the third 100 c.c.; and by potassic hydrate in the first two 100 c.c. 0·0003 grain; whilst by potassic permanganate there was no ammonia. The ammonia distilled off was altogether 0·0013 grain, which is a fraction less ammonia than was contained in the urea employed.

This experiment was repeated with a nearly similar result.

Experiments were next made with a solution of urea equal to the 120th part of a grain of urea in a gallon of water, and likewise with still smaller portions of urea, when it was found in all cases that with sodic carbonate all the ammonia contained in the urea distilled over in the first 100 c.c.

From these experiments it would appear that urea is decomposed entirely

when distilled in the ordinary manner with sodic carbonate, but only when in extremely dilute solutions; requiring the assistance of potassic permanganate to decompose it even when so dilute as in the proportion of the 1-80th part of a grain of urea in a gallon of water, in five millions; and requiring the assistance of potassic hydrate to decompose it even when diluted to an extent above one part in seven millions; and that is only decomposed by sodic carbonate alone when diluted somewhat above this point.

I may add that these and all other experiments were made with distilled water, which, tried in every way, showed not a trace of ammonia by Nessler's test, and that every experiment was made by dissolving at the time fresh crystals of urea; or, in other words, that no solution of urea was employed which had been made or kept any time. I may also add that I found a considerable difference in the various specimens of urea which I examined; all gave distinct indications of ammonia by the Nessler test; the larger, less coloured, and finer the crystals, the more was the ammonia. I need scarcely add that working upon such very dilute solutions as I was doing, the latter specimens yielded sensibly more ammonia by the sodic carbonate and potassic hydrate than those showing less indications of ammonia by the Nessler test; still I do not doubt that working with any ordinary urea, the results will not be far different from my own, although variable.

The next part of the process to which I wish to call attention is the estimation of what is termed the "albuminous substances."

According to Messrs. Wanklyn, Chapman, and Smith, albumen, such as from white of egg, yields no ammonia, ascertained by Nessler's test, when a solution of albumen is distilled with the proportions of sodic carbonate, 30·87 grains (two grammes), which they say they use to decompose the urea; whereas, as I stated before, in all my experiments I had invariably found that ammonia was envolved under such circumstances. I may observe that hitherto my experiments had been made upon what might be termed rather strong solutions (one grain of dry albumen in a gallon of water), and hence I was led to make the following experiments with what I conceive to be weak solutions:—

The first experiment was made with a quantity about equal to the 1-20th part of a grain of dry albumen to 1 gallon of water.

100 grains of the white of new-laid eggs, dried, gave 12·00 grains of dry residue containing 1·884 grains of ammonia; or 100 grains of such white of egg contained 1·884 grains of ammonia.

A litre of water was taken, in which was dissolved an amount equal to 0·093 grain of white of egg, containing 0·00175 grain of ammonia, and was distilled with 30·87 grains (two grammes) of sodic carbonate; in the two first 100 c.c. of the distillate 0·0006 grain of ammonia were estimated by Nessler's test, in the third 100 c.c. there was not a trace of ammonia; potassic hydrate was then added, and the distillation was gone on with as before, when not a trace of ammonia was discovered in any of the three 100 c.c. distilled; potassic permanganate was then added, and the distillation proceeded with, when it gave, principally in the first distillate, 0·001 grain of ammonia. Altogether there was a loss of 0·00015 grain of ammonia in the albumen.

This experiment was repeated with somewhat similar results, only rather more ammonia was envolved by the sodic carbonate, and again none by the potassic hydrate, and the remainder by the potassic permanganate.

The next experiment was made with about 1-40th part of a grain of dry albumen to a gallon of water, as follows:—

A litre of water was taken, in which was dissolved an amount equal to 0·0466 grain of white of egg, containing 0·00087 grain of ammonia, and distilled with the sodic carbonate. The two first contained 0·0007 grain of the ammonia; potassic hydrate gave no ammonia in any of the three 100 c.c., and potassic permanganate gave 0·0001, which is a loss of 0·00007 of a grain of the ammonia contained in the white of egg employed.

Another experiment was made with a quantity equal to the 1-80th part of a grain of dry albumen to a gallon of water, as follows:—

A litre of water was taken, in which was dissolved an amount equal to 0·0233 grain of white of egg, containing 0·000435 grain of ammonia, and distilled with the sodic carbonate, the first two 100 c.c. gave 0·0002 grain of ammonia. By the potassic hydrate no ammonia was given off, and by the potassic permanganate 0·0002 grain, showing altogether a loss of ammonia equal to 0·000035 grain.

Another experiment was made with a quantity about equal to the 1-160th part of a grain of dry albumen to a gallon of water, as follows:—

A litre of water was taken, in which was dissolved 0·01165 grain of white of egg, containing 0·000217 grain of ammonia, and distilled with the sodic carbonate. In the first two 100 c.c. of the distillate all the ammonia was evolved, in the third 100 c.c. there was none, nor when distilled with potassic hydrate or potassic permangnate was there a trace to be found.

This experiment was repeated and with the same results, all the ammonia being evolved in the first two 100 c.c., when the solution was distilled with sodic carbonate alone.

In all these experiments it will be seen that with the sodic carbonate a distinct quantity of ammonia is evolved, and likewise that in all these experiments, strange though it may appear, after the ammonia has been evolved as far as is possible by the sodic carbonate, that potassic hydrate evolves not even a trace, and it is only on the addition of potassic permanganate that the final quantity of nitrogen is expelled as ammonia. It will likewise be seen that, as in very dilute solutions of urea, all the nitrogen is expelled as ammonia by the sodic carbonate, so likewise this is the case in very dilute solutions of albumen.

The whole of the above experiments, both with the urea and the albumen, were conducted in ordinary retorts of not less than twice the capacity of the liquid to be distilled, and as nearly all alike in shape and size as it was possible to get them, and every endeavour was made to distil the solutions at a rapid speed and as nearly under the same circumstances as possible, otherwise I do not think the results obtained would have been so regular as they are, but as far as I can judge from other experiments quite the reverse; still on the whole they would be generally confirmatory of the results I have obtained.

Since making these experiments, my attention has been directed to a paper by Mr. Chapman, "On Nessler's Test for Ammonia," wherein that gentleman says that in comparing a solution to be tested with the ammonia standard, after adding the test he allows the liquids to stand for ten minutes before he compares them. My own experience, and I know it is that of others, is that this time is not nearly sufficient to develop the colour properly, and this is especially the case with very dilute solutions of ammonia; that being so, I do not see why such solutions should not be allowed to stand until the colour is fully developed in them, although it may take a longer time, in which case experience has taught us that the results are a deeper and more defined colour, which admits of better, I might almost say, of perfect comparison. In carrying out the above experiments sufficient time was invariably allowed for the proper development of the colour when determining the amount of ammonia in all of the distillates.

ON AN APPARATUS FOR INDICATING THE PRESENCE AND AMOUNT OF FIRE-DAMP IN MINES.

By GEORGE F. ANSELL.

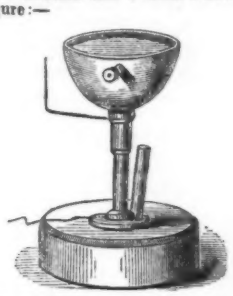
[*Read before the British Association.*]

The idea embodied in the apparatus was founded on the law of diffusion announced by Mr. Graham, that gases diffuse in the inverse proportion to the square root of their densities, or, more popularly, that light gases diffuse more rapidly than heavy ones. Mr. Ansell showed, by experiment, that when a tube closed at one end by plaster of Paris was filled with common coal gas, the lighter part of the compound was rapidly diffused through the plaster, as was at once seen by the yellow flame and slight explosion which ensued on bringing a lighted match close to the closed end. Hence, Mr. Ansell said, his proposition. In a pit the case is the reverse of that of the tube. There the gas is ready to escape into the galleries, and the apparatus must therefore be modified to suit the varying circumstances. The essential parts of the apparatus may be described as consisting of an alarm bell and a telegraph needle—the former being rung and the latter deflected by an electric current, which was set in motion by the action of the dangerous gas. The means by which this was effected consisted of an iron cup, on which was fixed a disc of white Sicilian marble, standing on a U-tube, which contained a quantity of mercury. The marble here represented the plaster which closed the end of the tube in the first experiment, and through it the dangerous gas was diffused. As it did so, the mercury was pressed up into the other extremity of the tube, completed the previously broken circuit, and an alarm was given by the ringing of the bell and the deflection of the needle.

Mr. Ansell proceeded to say that in coal-fields there are many casualties—including the bulk of the accidents arising from explosion—caused by a sudden irruption of fire-damp (carburetted hydrogen), to such an extent as to render the atmosphere in even a mile of space explosive in a few minutes, and there are cases on record where an enormous space has been so polluted in a few seconds; but the common event is to find that a fall of roof, or the breaking in of a thin part of the sides or floor of a gallery, liberates an amount of gas which by mixture with the ordinary air of the pit renders the whole explosive. This mixture travels on slowly with the ventilation till it meets a light, and possibly an hour after its first formation destroys many lives. A source of great danger is that state of the pit which arises from the gradual bleeding of gas from coal. As one walks in a pit, one hears a continual "click," somewhat like the noise of a cricket. In some pits, this may arise from the settling down of the strata and cracking of the coal, but the experienced ear soon knows the difference. Should any obstruction arise to the ventilation, this bleeding very gradually raises the atmosphere from zero (the point of purity) to the point of explosion; or it may be that a gradual fall of the barometric pressure admits of the oozing out of gas either from a goaf, or from the mass of coal, and this, although minute, may be to such an extent as to render explosive the whole air of the pit if the ventilation be not very good. There are parts of a pit where gas may be so accumulated in half an hour, others where it may be two hours, and again others a whole day in rising to a dangerous mixture.

It is no uncommon thing to find 30 per cent. of gas next the roof; at 6 inches below, 20 per cent.; and at 15 inches no gas at all. I propose to fix the instruments side by side, one for *sudden* and the other for *slow* accumulations, in pigeon-holes cast in iron posts, such as are used to support the roof, and to be used in addition to the ordinary supports for no other purpose than to carry the indicators, the pigeon-holes being clear all through, so that the gas can surround or sweep over the instruments while they are thus perfectly protected from falling substance; for the gas as it occurs in the pits is very curious in its habits, and from causes too minute to enumerate here it "goes away" from a spot with very little disturbance. The pigeon-holes being formed in iron posts would protect the instruments from falling roof, &c., while grooves may be cast in the sides of these posts for the telegraph wires. It has been objected to by some that these instruments would cause greater destruction of life than now obtains, but these persons forget that my instruments are not intended to displace other means of safeguard. They are simply proposed as additional means of knowledge.

For the indication of carbonic acid I make a necessary alteration, which will be seen in the figure:—



This hardly needs description, for it will be seen at a glance that the current is completed by the rising of the mercury to the wire within the precincts of the closed chamber, formed by the neck of the funnel, and is adjusted for use by turning the base on which it stands, when a cork rises against a leather bag and presses the mercury up to the required height Whether marble will stand for a long period in contact with carbonic acid, and without disintegration, has to be determined; if not, I can replace it by another septum. This instrument is proposed for use in those mines where carbonic acid becomes a dangerous substance for the miner. It has been sought by the French vine growers as a means of telling the time of the commencement of fermentation, and it seems probable that the English brewers will use it for a similar purpose.

In the event of fire-damp being known to exist, either when found by the fixed indicators or by the safety lamps, I propose for the use of the miner, the manager, or his deputy, an aneroid indicator, which is not intended for the *detection of gas in the pit*. The intention of this particular instrument is that it shall be used to determine the amount per cent. of fire-damp or carbonic acid where they are known or suspected to exist; and for these purposes it must be used in rigid accordance with the instructions given with it, not according to the fancy of the user, or as *he thinks it should be used*.

It must be mentioned that the same amount per cent. of fire-damp in different mines requires a varying time for diffusion through the same tile. The cause of this is not known, but it is under investigation. This variation is from 45 to 60 seconds; but in the same pit it is invariably of a uniform time, so that, once determined, there is no trouble. That this is a property

of the gas, is proved by the fact that 10 per cent. of gas in one pit will explode violently, while 10 per cent. in another explodes with much less violence. The underviewers call one a sharp gas and the other a slow gas, and the appearance is perfectly well marked if observed for a few times in the Davy lamp.

A mine, to be well ventilated, should be so supplied with air that a considerable eruption should be detected below the point of explosion. Ventilation which is only sufficient for ordinary occasions must be considered entirely insufficient. The Act of Parliament at present in force specifies that the working places shall be so ventilated as that "under ordinary circumstances" they shall be "in a fit state for working passing therein." This clause of the Act should be altered, and the Act should specify that 5 per cent. of fire-damp should be the maximum ever permitted to attain, because $7\frac{1}{2}$ per cent. is the minimum explosion point, and 5 is two-thirds of $7\frac{1}{2}$, which is surely as near as could be allowed with safety.

It has been objected that my instruments are too delicate for use in the pits—that, in fact, they demonstrate the existence of so small an amount of gas as to render their adoption a probable source of trouble by "showing the presence of $1\frac{1}{2}$ per cent. of fire-damp, and thus causing alarm, while that amount is actually harmless." To this objection I would reply that I have made my instruments so delicate, because in their former state it was objected that they would not show *small quantities*—that is, smaller quantities than could be detected by the safety-lamps now in use. But this objection has no weight, because the instruments, although capable of being so delicately set, need not be so adjusted unless by the will of the responsible person. I prefer that they should be so adjusted as to give warning only when the quantity of gas present reaches the limit of the minimum explosion point; still I would urge that the fact of an instrument showing small quantities as well as large does not necessarily render it valueless.

When I was permitted to exhibit and explain my instruments in committee-room D of the House of Lords, Mr. J. M. Day inspected them, and in behalf of the Mining Association of Great Britain, he made to me the following proposition:—"That I should make experiments in the coal-pits he would select, and if my instruments would effect what I said they would do, they would prove to be very valuable and would be adopted; if, on the other hand, they failed in such trials there would be an end of the matter."

In accordance with this suggestion I visited such pits as Mr. Day appointed, and which he purposely selected, that I might meet every variety of circumstance. My experiments were admitted to be successful. I have just (between the 26th of August and the 1st of September) completed an exhaustive series of experiments in the Monkland Pits at Airdrie, and Mr. Murray gives me permission to say that he has satisfied himself that my indicator is practicable and reliable.

From facts within my own knowledge, I have reason to believe that one of the reasons why my instruments are not adopted is, that the colliers would not go down the pits or remain at work if it were demonstrated to them that there was a dangerous accumulation of fire-damp. That the men have fear of fire-damp is demonstrated by the fact that the bench of magistrates of Wednesbury did, on the 2nd of November, 1866, convict and sentence to fourteen days' imprisonment three colliers for refusing to work in a coal mine because the said mine was full of fire-damp. Yet the owners took no measures to prove to the men the absence—thus admitting the presence of fire-damp, but contented themselves with the statement that the complaint of the men, although supported by witnesses, was an excuse for a holiday. I am of opinion that coalowners and their agents will not voluntarily adopt any new proposition, they having for years blindly ignored the Davy lamp, and they still refuse in a very great measure to adopt safety-cages, safety-hooks to prevent overwinding, and the necessary number of ventilating shafts, abiding only just inside the law of the land.

I wish to remark that the state of the barometer *does not* give warning of the irruption of fire-damp till some hours *after* it has taken place; and in such cases mining engineers admit that an instrument would be of real service.

While the French have offered considerable prizes for the invention of means devised for the saving of *life* in mines, English mine owners have contented themselves with offering prizes for coal-cutting machines devised only for the saving of *labour*, but I humbly submit that if I am right in my supposition that my instruments are calculated to save life, they ought to be adopted, and all I ask is that they should be fairly tried. I am permitted to refer inquiries to Mr. F. Murray, Monkland House, Airdrie, who has some of these instruments in his pits, and who will kindly exhibit them in action.

In consequence of a wish expressed by Francis Murray, Esq., Monkland House, Airdrie, I sent him some instruments, that he, in my absence, might form an opinion as to the practical value of my indicators, and that the colliery people, workmen as well as officers, might find out any objections to the instruments. Mr. Murray, in a note to me, says:— . . . "the instrument was carried into the suspected places and put on the top of a post close to the roof of the working; in less than a minute after the connexion was made the bell rang, the aneroid (a pocket indicator) at the same spot indicating 45 per cent. of gas. . . . I allowed the bell to ring for about a minute, and then screwed up the screw until it ceased to touch the mercury; in less than a minute the alarm sounded again. I screwed up again with the same results until the screw would go no further." Mr. Murray then placed the instrument "on the floor where the aneroid indicated no fire-damp . . . readjusted the mercury, and repeated the above experiments with the same results."

"I then by means of the aneroid ascertained the height at which $7\frac{1}{2}$ per cent. of gas was present, and then the alarm sounded in about five minutes. I then got all the gas driven out of the place, the aneroid indicating nothing at any height, and fixed the syphon at the height which formerly contained $7\frac{1}{2}$ per cent. of gas. In one hour the alarm-bell sounded. One turn of the screw was given, and the alarm sounded again in ten minutes. The aneroid at the moment of the second alarm indicated 8 per cent. of gas. These experiments were made with a new instrument covered with $\frac{5}{8}$-inch marble, and an old instrument the thickness of marble I do not recollect." This was an old instrument which had been in use a year in some pits, and is covered with $\frac{1}{2}$-inch marble.

On Tuesday, August 27, I went into the pits with Mr. Murray and some of his people, experimenting till 11.30 P.M. without a single failure. Quite the last thing we chased the pit of gas and set four syphon instruments, with a view to see if, when gas accumulated slowly in the night, the instruments would give warning and maintain their action till the morning. These instruments were visited in the morning by Mr. Crum and the fireman of the pit. Mr. Crum writes to me as follows:—"The place in the pit was filled with fire-damp till past the battery and the bell. The bell rung with $1\frac{1}{4}$ inch of zinc above top. All observations in the dark—no light, even in main road—no Davy lamp."

Mr. Murray was present at part of these experiments, and the fireman, accompanied by a collier, was present at the whole of them, reading the barometer indicator with me. Mr. Murray says: "There is no doubt, from these experiments, which extended over a fortnight, that the instruments are quite reliable and quite easily managed. We worked under great disadvantages; the place was very low—I think the men said 3 feet 4 inches—but there is no difficulty in obtaining the results needed."

Professor ANDERSON believed that this was the first attempt to apply the law of diffusion to practical purposes, and it was certainly an invention of the highest importance. The only drawback to the instrument was that its nicety required it to be worked, not by ordinary colliers, but by intelligent men.

Mr. J. L. BELL, of Newcastle, feared that the very nature of the work of a colliery, which would necessitate the perpetual movement of the apparatus, might impede its use by the workmen; but thought that, in the hands of the coal viewers, it might be turned to good account, as the accidents most feared by coalowners were those in which the atmosphere of a whole gallery, or a portion of one, was polluted. The instrument would be likely to be of immense value in the prevention of that wholesale destruction of life we had so often to lament. He was afraid, however, that familiarity would breed contempt, and that, after the novelty of the invention had passed away, the men would be apt to neglect it.

Mr. ANSELL, in reply, stated that Mr. Murray's ordinary working colliers had used the instrument with perfect success. Mr. Murray had suggested that the whole apparatus should be enclosed. When this was done, the workmen could in no way misuse it.

RESIGNATION OF MR. PRIDDEN.—We understand that the senior secretary of the metropolitan gas companies, Mr. Charles Pridden, is about to resign his position at the Phœnix. Of course, after so many years of faithful services, this step must cause regret to every member of the company. As he has been suffering for the last three years from heart disease, there is no hope of his perfect recovery at sixty years of age; but we trust that his retirement from active duties may be the means of prolonging his days, and enabling him to enjoy his well-earned pension.

Share List of Metropolitan Gas Companies.

No. of Shares issued.	Amount per Share.	Name of Company.	Amount paid up per Share.	Div. per Cent. per Annum	Price per Share.
	£		£ s d	£ s d	£ s d
8000	10	Anglo-Romano . .	10 0 0	9 0 0	11 to 12
5000	20	Bahia (Limited) . .	20 0 0	nil.	16 10 0
1000	20	Do., preference .	20 0 0	10 0 0	27 10 0
750	20	Do., do., redcem.	10 0 0	10 0 0	12 10 0
40000	5	Bombay (Limited) .	5 0 0	5 0 0	4¼ to 4¼
10000	5	Do., third issue .	3 0 0	5 0 0	3⅛ to 3⅛
10000	20	British, Limited . (Norwich, Hull-Sculcoates, Hanley, Tunstall & Shelton (Potteries), Trowbridge, & Holywell.)	20 0 0	6 0 0	28 to 29
12000	50	*Chartered*	50 0 0	8 10 0	55 to 56
6000	50	Do.	40 0 0	8 10 0	42 0 0
10000	20	*City of London*, A shares	20 0 0	9 0 0	22 to 24
10000	10	Do., B shares	10 0 0	4 0 0	6½ to 7
9629	10	Do., new shares.	10 0 0	9 0 0	11 to 12
25000	25	City of Moscow (L)	25 0 0	£7 intr.	14 5 0
17490	25	*Commercial* . . .	25 0 0	10 0 0	31 to 32
2500	20	Continental Union.	20 0 0	8 0 0	13 to 14
17500	20	Do.	15 0 0	8 0 0	9 to 10
10000	20	Do., preference .	20 0 0	7 0 0	
5827	5	County & Gen. (L)	5 0 0	nil.	
2000	5	Do., preference . (Pater, Pembroke, Ely, Lea Bridge, Northfleet, Walton, & Ware.)	5 0 0	nil.	
5000	10	*Crystal Pal. Dist.*	10 0 0	10 0 0	13 to 14
5000	10	Do., preference .	10 0 0	6 0 0	12½ to 13
10000	10	Do., new shares .	2 10 0	7 0 0	2½ to 3
4000	50	*Equitable*	50 0 0	10 0 0	65 to 66
4000	25	Do., new shares.	25 0 0	10 0 0	33 to 34
23406	10	European (Lim.) .	10 0 0	10 0 0	12⅞ to 13⅛
12000	10	Do., new shares. Boulogne, Amiens, Rouen, Caen, Havre, & Nantes.)	5 0 0	10 0 0	6¼ to 7
20000	10	*Gt. Cent. Gaz Cons.*	10 0 0	10 0 0	13 10 0
5000	10	Hong Kong (Lim.)	10 0 0		to 10
26000	50	*Imperial*, old sh.	50 0 0	10 0 0	64½ to 65
1300	100	Do., bonds . . .	£100	10 0 0	170 to 172
2391	25	Imperial Austrian.	25 0 0	nil.	
28000	50	*Impl. Continental* (Amsterdam, Berlin, Ghent, Hanover, Lille, Rotterdam, Aix-la-Chapelle, Antwp., Bordeaux, Brussels, Cologne, Frankfort-on-M., Haarlem, Stolberg, Toulouse, & Vienna	43 15 0	16 0 0	97 0 0
400	100	Impl. Mexican (L.)	75 0 0		
3000	40	*Independent* . . .	40 0 0	10 0 0	50 to 53
3000	10	Do.	10 0 0	5 0 0	7 to 9
3000	20	Do.	12 10 0	7 10 0	13 to 14
7133	50	*London*	50 0 0	10 0 0	65 10 0
5610	25	Do., 1st pref. .	25 0 0	6 0 0	25 to 26
503	50	Do., 2nd pref. .	50 0 0	6 0 0	
214	50	Do., 3rd pref. .	50 0 0	6 0 0	
18781		Do., 1st pref. sh		6 0 0	
11828		Do., 2nd pref. sh		5 0 0	
12000	5	Malta & Medit. (L.)	5 0 0	4 0 0	3¼ to 4
6000	5	Do., preference .	5 0 0	7 0 0	5 0 0
30000	5	Oriental, Calcutta	5 0 0	8 10 0	5⅛ to 5⅜
30000	5	Do., new shares.	1 0 0	8 10 0	1 to 1⅛
10000	5	Ottoman (Limited)	5 0 0	nil.	2 to 2⅛
10000	10	Pará (Limited) . .	10 0 0	6 0 0	9¼ to 9⅜
27000	20	*Phœnix*	20 0 0	10 0 0	25 to 25½
3600	100	Do., new	35 0 0	7 10 0	34½ to 34⅝
144000	Sk.	Do.	100 0 0	5 0 0	68 to 70
5000	20	*Rateliff*	20 0 0	10 0 0	22 to 24
	20	Rio de Janeiro (L.)	20 0 0	10 0 0	22 to 24
6959	5	Singapore (Lim.) .	5 0 0	3 10 0	
2000	5	Do., preference . Shanghai	5 0 0	7 10 0	
4800	50	*Sth. Metropolitan*	50 0 0	10 0 0	71 to 73
15000	10	*Surrey Consumers*	10 0 0	9 0 0	12½ to 13
10000	10	Do., new	6 0 0	9 0 0	7½ to 8
9000	4	United General . . (Limerick)	4 0 0		2 to 2½
10000	10	*Victoria Docks.* .	5 0 0	6 0 0	
3000	10	*Wandsworth & Putney*	10 0 0	7 10 0	13½ to 14
20000	10	Western (L.) A sh.	10 0 0	10 0 0	13 15 0
10000	10	Do., B shares.	5 0 0	10 0 0	6⅞ to 7
10000	10	Do., C shares.	5 0 0	10 0 0	7 0 0
20000	10	Do., D shares.	1 0 0	10 0 0	1¼ to 2
8000	5	*West Ham*	5 0 0	7 10 0	6 10 0
6000	5	Do., new shares.	3 0 0	7 10 0	3 18 0
551	10	West London Junction (Lim.) .	10 0 0	6 0 0	
520	10	Do., preference .	10 0 0	6 0 0	

Price Current.

CASTINGS.—*Per Ton.*

Average Weight of Cast-iron Gas-pipes, per Yard.

1½ in.	2 in.	2½ in.	3 in	4 in.	5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	12 in.
16	21	28	33	51	70	89	107	126	149	177	208 lb

Retail Prices are 5 to 10 per cent. higher.	London.	Glasgow.	Newcastle	Wales.	Yorkshire, Derbyshire, and Staffordshire.
	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
Pig Iron, No. 1 (g.m.b.)	3 15 0	2 14 9	2 12 6	3 10 0	3 10 0
1¼ and 2-inch Socket-pipes	7 10 0	6 0 0	6 15 0	6 15 0	7 10 0
3 and 3-inch ditto	7 0 0	6 0 0	6 5 0	6 10 0	7 0 0
4 and 5-inch ditto	6 10 0	5 10 0	5 15 0	6 0 0	6 10 0
6 inches and upwards ditto	6 5 0	5 0 0	5 10 0	5 15 0	6 5 0
Retorts, 1st fusion, hot blast	6 0 0	—	5 5 0	5 10 0	6 0 0
Ditto, 2nd ditto, cold ditto	7 0 0	5 15 0	5 15 0	6 0 0	7 0 0
Tank-plates, ¾ thick and above	6 10 0	5 10 0	5 10 0	5 15 0	6 5 0

WROUGHT-IRON TUBING,

Subject to 50 per cent. Discount.

	2 in.	1½ in.	1¼ in.	1 in.	¾ in.	½ in.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Patent Welded Tubes, from 2 to 12 feet—per foot	1 8	1 0	0 10	0 7	0 5	0 4½
Ditto ditto, from 6 inches to 18 inches—each	3 0	2 0	1 9	1 3	1 0	0 9
Connecting-pieces, or Long Screws	3 6	2 3	2 0	1 6	1 2	0 11
Bends, Springs, and Elbows (wrought iron)	3 9	2 3	1 9	1 0	0 10	0 8
Tees, wrought or cast	4 0	2 6	2 0	1 6	1 1	0 10
Crosses, ditto	4 6	3 0	2 6	2 0	1 6	1 2
Iron Cocks	17 6	9 6	7 6	4 6	3 3	2 6
Ditto, with brass plug	28 0	16 0	13 0	7 0	5 6	4 6
Diminishing Sockets, Caps, Plugs, and Nipples	1 3	0 9	0 8	0 6	0 5	0 4
Plain Sockets	1 0	0 8	0 7	0 5	0 4	0 3
Syphons, 2-quart	15 0	14 0	13 6	13 0	12 0	—

GAS COALS.—*Per Ton.*

Newcastle.—Unscreened:—

East Castle, Haswells, Nettlesworth Primrose, and South Pelaw	7s. 6d.
Felling, North Pelton, Redheugh Main, Walker's Primrose, West Wear, and Whitwell Primrose	7 9
Burnhope, Craghead, Charlaw, Derwent, Edmondsley, Eighton Moor, Hartlepool Pelaw, Holmside, Lambton's Gas, Lanchester Pelaw, Medomsley, Mickley, New Pelaw, Pelaw Main, Ravensworth, South Moor Pelton, South Leverson, Townley Main, Tyne Main, West Pelaw, Wearmouth Hutton, and Witton	8 0
Pearth, Ravensworth Pelaw, Waldridge, West Garesfield, and West Pelton	8 3
Brancepeth, Dean's Primrose, New Pelton, Pelton, South Pearth, Stella, Urpeth, Washington Hutton, and West Leverson	8 6
Ramsay's Newcastle Cannel	20 0
Wigan Cannel (at Liverpool)	17 0

Scotch Cannel:—

Boghead (at Leith)	30 0
Kirkness, best (at Burntisland)	28 6
Capeldrae, 1st quality (at ditto)	28 6
Ditto, 2nd ditto (at ditto)	18 6
Cowdenbeath	12 0
Lesmahago (at Glasgow)	31 6
Ditto (at Granton)	32 6
Arniston	27 6
Wemyss	20 0
Haywood, Wilsontown (at Granton)	23 0
Pirnie, or Methill	15 0
Lothian's Cannel (at Leith)	28 0
Myles' Cannel	23 6

FREIGHTS.

Coastwise—Newcastle.—Per Ton:—

Chatham and Rochester	5s. 9d. to 6 0d
Cork	9s. 6d to 9 6
Dover, Folkestne, & Rgte	6 3
Dublin	8s. 6d. to 10 0
Exeter Quay	8 6
Ipswich	5 0
London (from Leith)	6 0
London (Pool)	6 0
Lowestoft and Yarmouth	4 9
Portsmouth & Southampton	7 5
Plymouth *Per Keel*	£3 0 0
Shoreham *Per Ton*	6 9
Whitstable	6s. to 6 3
Weymouth	7 6

Foreign.—Per Keel:—

Barcelona	£13 10
Bordeaux	13 10
Boulogne and Calais	7 0
Cadiz	13 0
Cronstadt	—
Copenhagen	9 10
Genoa	15 0
Hamburg	8 0
Havre de Grace	9 15
Leghorn	15 0
Lisbon	£12 10s. to 13 0
Rotterdam	8 10
Stettin	10 10
Trieste	11 0
Venice	£14 to 15 0

SUNDRIES.

Best Nstle. Fire-bks., p. 1000, £2 10s. to	£2 15 0
Cliff's Fire-bks. (at Wortley), p. 1000	2 15 0
Ingham's ditto (at Wortley), p. 1000	2 15 0
Fire-clay Retorts, p. ft. run, 5s. 6d. to	6 7 0
Tough Cake Copper, p. ton	80 0 0
English Pig Lead, p. ton	19 12 6
Welsh Bar Iron (in London), p. ton	6 10 0
Foreign Spelter, p. ton	21 10 0
English Block Tin, p. ton	96 0 0
Bancs, p. ton	94 10 0
Tarred Rope Yarn, p. cwt.	1 0 0

Advertisements.

WANTED, a Man to take the MANAGEMENT of a small Gas-Work, where the whole of the duties will have to be performed by the person appointed. All applicants must have filled a similar situation, and their letters accompanied with references and age. Wages £1 5s. per week, with house, coal, and gas.

Address THOMAS HICKS, Secretary, Burnham Gas Company, Limited, Burnham, SOMERSET.

MAIN & SERVICE LAYER WANTED.

WANTED, a respectable, steady, sober Man as MAIN and SERVICE LAYER. One who thoroughly understands the fitting up of wrought and cast iron work in retort-house preferred. Wages 30s. per week. Constant employment. Men of good character need only apply in writing.

Addressed to "CAMBRIA," care of Mr. King, 11, Bolt Court, FLEET STREET, E. C.

WANTED, by a young Man, aged 23, a situation as MANAGER of a Gas-Work. Has had 10 years experience on large and small works, can set clay or iron retorts, lay mains or services, or do any alterations that may be required on a Gas-Work. Satisfactory references can be given.

Address F. D., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS APPARATUS.

FOR SALE, at the Works of the Crystal Palace District Gas Company, a capital Annular CONDENSER for 12-in. connexions, consisting of 8 towers (with tar-boxes, &c., complete), 20 ft. high; the internal pipes 18 in., and external 24 in. in diameter. The Condenser is as good as new, and will be put into railway trucks on the company's siding for £175. This sum to include the base stones. Also a Steam Boiler (6-horse), a 12-in. Station Governor, and a Station Meter with 6-in. connexions.

Tracings supplied on application to Mr. E. S. Cathels, the Engineer and Manager.

By order of the Board,

MAGNUS OHREN, Secretary.

Offices at the Works, Lower Sydenham, S.E.

PURIFIERS FOR SALE.

A SET of Two Purifiers, each 4 ft. long, 5 ft. wide, and 4 ft. deep, with one scrubber, 24 condenser pipes, 2 ft. long, with boxes, change valves, and pipes to match. All on one base, 14 ft. long and 7 ft. wide. Removed to make room for larger ones, and may be bought cheap.

Apply to R. HEAPE, Secretary, Gas-Works, SWADLINCOTE.

TO GAS COMPANIES AND ENGINEERS.

FOR SALE.—A Good Cast-Iron Tank, in excellent condition, 45 feet diameter, 14 feet deep, either with or without Gasholder.

Also the following STATION-METERS:—

One	to pass	12,000	cubic feet per hour.
One	,,	8,000	,, ,,
One	,,	4,000	,, ,,
Two	,,	3,000	,, ,,

The whole have been taken apart, thoroughly examined, and are in good working order, equal to new.

The above have been taken down to make room for larger.

Apply to JOHN VICKARY, Gas Engineering Works, EXETER.

GAS PURIFIERS.

FOR SALE, 4 Dry-Lime Purifiers, 3 ft. 6 in. square and 3 ft. deep, with valves and connexions complete.

Apply to THOMAS KIRKHOPE, Secretary, Gas Company, ARDROSSAN, N.B.

M. A. MERFIELD, Enameller of Gas Plates, Watch and Clock Dials, Labels for Railway Carriages, Telegraph, and Gauges, &c. An old established business.

216, GOSWELL ROAD, LONDON, E.C.

JOHN VICKARY,

GAS ENGINEER AND CONTRACTOR, IRON AND BRASS FOUNDER,

WORKS—EXE ISLAND, EXETER,

Tenders his best thanks to the various Gas Companies in **England, Ireland, and Wales,** for the very liberal and kind support he has received for the last **22 years,** during which period he has erected and extended above **200 Gas-Works.**

In addition to the numerous towns wherein he has been engaged, he begs reference to the following testimonial:—

Plymouth and Stonehouse Gaslight and Coke Company.

Sir,—I have much pleasure in testifying that the 100-foot Telescope Gasholder and Cast-Iron Tank, erected by you for this Company in 1862, has given the highest satisfaction, and never required the slightest attention or adjustment since its completion.

(Signed) PETER ADAMS, Chairman.

He has also erected a 100-foot Gasholder and Cast-Iron Tank at **Exeter;** an 80-foot Telescope Gasholder and Iron Tank at **Devonport;** a 90-foot at **Torquay,** &c. &c. At either of those works satisfactory references can be made.

He also begs particular attention to his **Improved Gas-Meters,** either **Wet, Dry, or Compensating,** the materials and workmanship of which guaranteed of the very best description, and which has gained for his Meters so excellent a reputation for these last **20 years.**

RETORTS, DIP & ASCENSION PIPES, HYDRAULIC MAIN, CONDENSERS, PURIFIERS, STATION-METERS, GOVERNORS, VALVES, and GASHOLDERS,

Of any size, and every description of article required in Gas-Works.

Mains, Tees, Connexions, and Syphons, from 2 to 12 in., always in stock, and supplied at Scotch prices.

Clay Retorts and Fire-Goods of every description.

Gas-Fittings of the most modern designs.

Iron Pipe and Fittings, Service Cocks, &c.

Plans, Specifications, and Estimate for the erection of New Gas-Works of any size furnished.

PHŒNIX GASLIGHT and COKE COMPANY.

NOTICE is hereby given, that the ADJOURNED HALF-YEARLY GENERAL MEETING of PROPRIETORS, holding previous to Midsummer last £300 paid-up capital and upwards in the said Company, will be held, pursuant to the Act of Incorporation, on WEDNESDAY, the 9th proximo, at Twelve for One o'clock, at the Bridge House Hotel, in the Borough of Southwark, for the purpose of declaring a Dividend to Midsummer last, and on other business; and that such Meeting will be made Special for the purpose of considering Notice of Motion given by R. A. Gray, Esq., "That in consequence of the Secretary, Mr. Charles Pridden's, impaired state of health, and in consideration of his long and faithful services for 37 years, he be granted a retiring pension of £600 per annum for life."

By order of the Court of Directors,
CHARLES PRIDDEN, Secretary.

70, Bankside, London, S.E., Sept. 25, 1867.

The proposed Half Year's Dividend will be payable immediately after the business of the Meeting has terminated; and afterwards at the Company's Office, at Bankside, on Thursday, the 10th proximo, from the hour of Twelve till Three, and then will be forwarded by post.

Shareholders are particularly requested to notify change of address.

FOR SALE, at the Warrington Gas-Works, one 6-horse power HORIZONTAL STEAM-ENGINE, suitable for working exhausters, pumps, &c.; and one BOILER, 10 ft. by 3½ ft.

Also one CYLINDRICAL SCRUBBER, 15 ft. by 5 ft., with hydraulic valves, by-pass, and 10-in. connexions complete.

The above to be sold in consequence of larger being substituted, and may be seen by applying to Mr. PATERSON, at the Works of the Company.

Warrington, Sept. 7, 1867.

PIRNIE OR METHILL CANNEL.

ONE of the best Gas Producing CANNELS for bringing up the quality of ordinary coal gas. See Dr. Frankland's Lecture, reported in the JOURNAL OF GAS LIGHTING, 30th of April last.

For price apply to PIRNIE COAL COMPANY, Leven, FIFE.

CAST-IRON Retorts, Socket Pipes, with Syphons and all requisite Connexions, Lamp Columns, Wrought Iron Tubing, Valves, Street Lamps, Sight Holes, Furnace Doors, Ash Pans, Charging and Coke Shovels, Iron Pails and Coke Barrows, Cross Bars, Fire Pots, Pumps, Iron Borings.

PURIFIERS, CONDENSERS, and SCRUBBERS erected complete, or the materials supplied; with every description of goods in use by Gas-Works, in stock, on wholesale prices, at

Mr. LYNCH WHITE'S,
Old Barge Iron Wharf, Upper Ground Street,
LONDON.

AUCHINHEATH, Lesmahago, Gas COAL, known in the market for the last fifty years as a first-class gas coal.

JAMES FERGUSON and CO.,

Sole Lessees of the Auchinheath Coal-Field, are prepared to ship the above at Glasgow, Greenock, and Ardrossan, on the west coast of Scotland; and at Granton or Leith, in the Firth of Forth, on the east coast. Also to forward them to any railway-station in Scotland or England.

Price and other particulars may be learned by addressing

JAMES FERGUSON and CO.,
GAS COAL WORKS,
LESMAHAGO.

PAYTON'S CYCLOIDAL METER
FOR MEASURING LIQUIDS.

Secured by Royal Letters Patent.

MANUFACTURED BY
THE LIQUID METER COMPANY
(LIMITED).

A. A. CROLL, *Chairman.* GEORGE RAIT, *Managing Director.*

238, KINGSLAND ROAD, LONDON, N.E.

The Liquid Meter Company respectfully solicit the attention of Water Companies, Builders, and others to the above efficient high-pressure Meter.

From extensive experiments which have been made with these Meters to test the accuracy of their measurement, they are found to be invariable in their indications under all conditions of velocity and pressure, and they are capable of discharging, without reduction of head, a larger quantity of liquid in proportion to their size than any other description of Meter.

For further particulars, address—

GEORGE RAIT, 238, Kingsland Road, London, N.E.

TO GAS ENGINEERS AND MANAGERS OF GAS-WORKS.

TURNER & ALLEN

Beg to inform the above that they have a new description of perforated figures for

NUMBERING STREET-LAMPS,

Which they can supply at a moderate cost. Sample sent on receipt of eight stamps to defray postage.

201, *Upper Thames Street, London.*

FORREST'S PATENT CYLINDER STREET-LAMP.

SOLE AGENTS:

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ENGINEERS AND FOUNDERS,
201, UPPER THAMES STREET,
LONDON.

Contractors for the supply of
LAMP-COLUMNS, LAMPS, FOUNTAINS, &c.,
To Railway and Gas Companies,
Local Boards, &c.
DESIGNS ON APPLICATION.

MARTIN'S
LEE MOOR PORCELAIN FIRE-BRICKS,

Containing no Lime, and only ·45 of Oxides, resist the strongest heats, and will last for Gas-Works longer than any others.

Samples and prices sent, and the highest references given, on application to

MARTIN BROTHERS,
ST. AUSTELL, CORNWALL.

WALTER FORD,
159, GRAY'S INN ROAD, LONDON.

MANUFACTURER OF WET AND DRY GAS-METERS, STATION-METERS, GOVERNORS, &c. &c.

Sole Manufacturer of **PADDON'S PATENT STREET-LAMP REGULATORS,** for insuring any required consumption. These Regulators are in general and increasing use, and references can be given to Gas Companies who use them for every Lamp.

GAS EXPLOSIONS PREVENTED
BY THE USE OF
JOHN RUSSELL & CO.'S TUBES & FITTINGS.

Gas Explosions are of frequent occurrence, but we do not hear of them unless death has resulted. As in the case at Clerkenwell lately, gas explosions may generally be traced to the use of Tubes of defective workmanship and inferior iron. Adopt the Tubes and Fittings of John Russell and Co., which are all of the best quality.

JOHN RUSSELL & CO.

ARE THE

INVENTORS OF THE LAP-WELDED TUBE FOR LOCOMOTIVE & MARINE BOILERS,

AND THE OLDEST MANUFACTURERS OF TUBES FOR GAS, STEAM, & WATER.

WAREHOUSES:

69, Upper Thames Street, E.C.; Commercial Street, N.E.; & Charles Street, Soho Square, London;
Also at 35, 36, 37, and 39, Granby Row, Manchester.

MANUFACTORIES:

The Old Tube Works, Wednesbury, and the Alma Works, Walsall Staffordshire.

Address to 69, UPPER THAMES STREET, LONDON, E.C.

PARIS EXHIBITION,

1867.

HONOURABLE MENTION.

NEWTON AND BRADDOCK,

GLOBE METER-WORKS, OLDHAM,

Manufacturers of

STATION METERS for GAS-WORKS, CONSUMERS METERS, GOVERNORS,

GAUGES, PRESSURE AND EXHAUSTER REGISTERS,

EXHAUSTER REGULATORS, &c.

N.B.—The flanges of the plates for the Square Station-Meters are planed so as to ensure perfect joints—guaranteed not to leak.

CALLEY'S

TORBAY IRON OXIDE PAINTS

Are Durable, Economical, and keep their Colour.

Awarded Honourable Mention at Dublin Exhibition, 1865, and Prize Medal, Paris Exhibition, 1867.

See "The Record of Engineering," 1864.
"The Journal of the Society of Arts," June 1, 1866.
"The Mechanics' Magazine," October 26, 1866.
"The Engineer," November 2, 1866.
"The Building News," November 9, 1866, &c.

WORKS: IRON ROAD, BRIXHAM, TORBAY.

LONDON OFFICE: 17, LAURENCE POUNTNEY HILL, CANNON STREET, E.C.

SCHOLL'S

PATENT PLATINUM

GASLIGHT PERFECTER.

Extract from Report by Dr. Letheby:—

"The results have been very remarkable, for they show an average increase of 63 per cent. on the illuminating power of the gas. I am of opinion, therefore, that the invention is of great practical value."

Price 1s. each for Fish-tail Burners.

To be had retail of Gas-Fitters and Ironmongers, and wholesale of

JOHN SCHOLL, 41 & 42, BERWICK STREET, OXFORD STREET, LONDON, W.

Terms on application. N.B.—A specimen sent free on receipt of Twelve stamps.

*** Further testimonials from Drs. Frankland and Crooks, showing the great practical value of this invention, will be shortly published.

JAMES MILNE & SON,

GAS ENGINEERS,

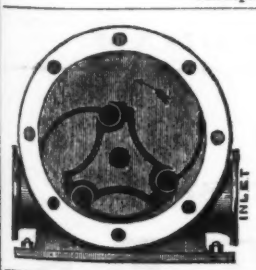
Gas-Meter, Gas Apparatus, and Gasfittings Manufacturers,

EDINBURGH, AND

2, KING EDWARD STREET,

NEWGATE STREET, LONDON.

Station-Meters, Governors, Consumers Meters, Gas Lustres, Chandeliers, Brackets, &c., and every description of Gasfittings and Gas Apparatus.



CHARLES HORSLEY'S

PATENT

GAS EXHAUSTER.

(From 250 Feet to 200,000 Feet per Hour.)

Also,

ROTARY TAR, OIL, AND LIQUOR PUMPS.

For particulars and prices apply to the Patentee,

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SAMUEL CUTLER & SON,

CONTRACTING GAS ENGINEERS, &c.

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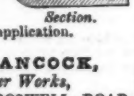

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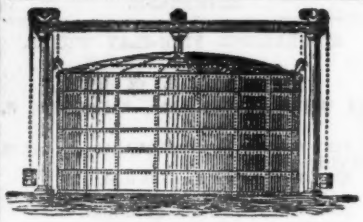

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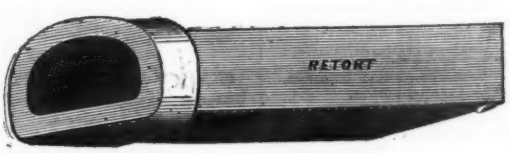

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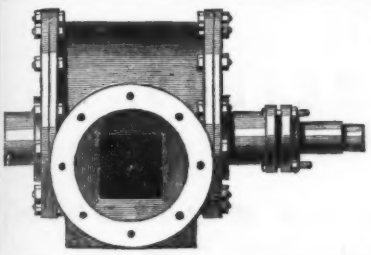

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FOUR-WAY VALVES, one of which is equal to three ordinary Valves.
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